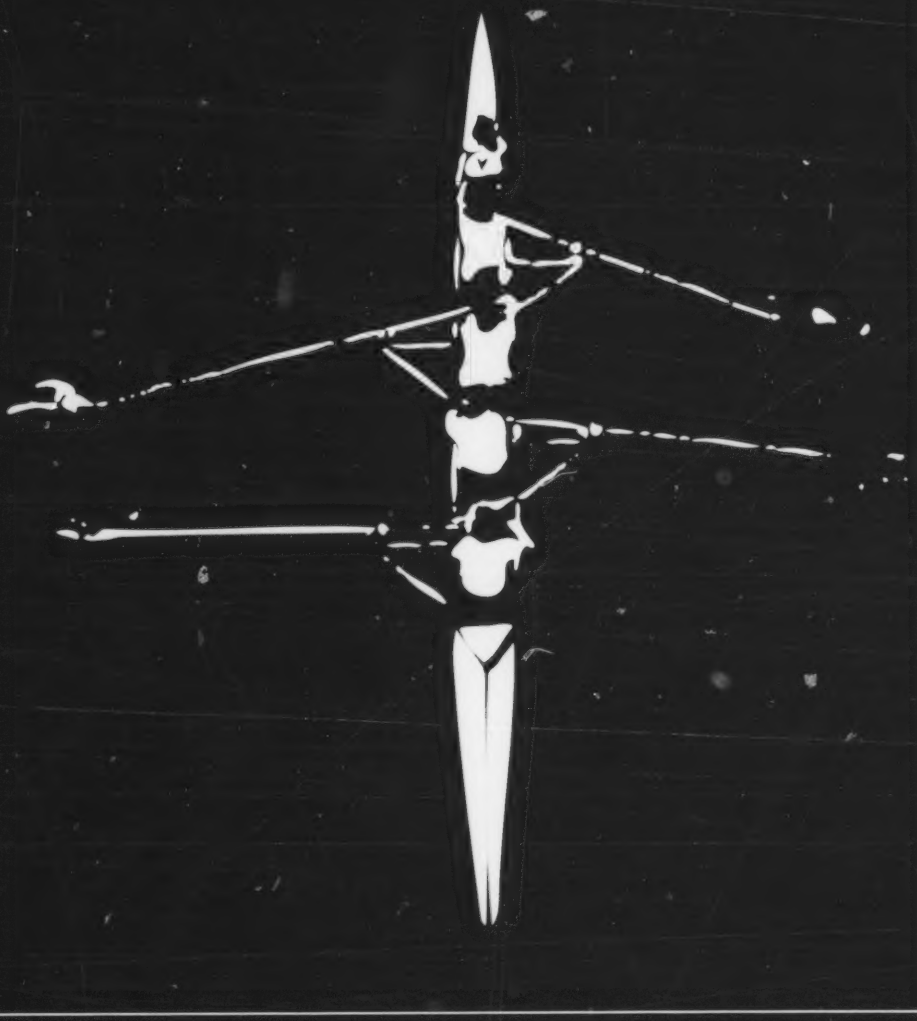
Pulling Together

Productivity, Innovation, and Trade



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Economic Council of Canada
1992

Pulling Together

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This Statement reflects the views of the Members of the Economic Council of Canada. Comments by Pierre Paquette and Marcel Pepin, and Ken Woods appear at the end of the Statement.

Members of the Economic Council of Canada

JUDITH MAXWELL, Chairman
CAROLINE PESTIEAU, Deputy Chairman and Director
HARVEY LAZAR, Deputy Chairman and Director

PETER M. BROPHEY
Public Affairs Consultant
Director, Xerox Canada Ltd.
Bond Head, Ontario

LÉON COURVILLE
Senior Executive Vice-President
Corporate Affairs
National Bank of Canada
Montreal, Quebec

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Alcan Automotive Structures
Montreal, Quebec

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Calgary, Alberta

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Toronto, Ontario

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Vancouver, British Columbia

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Quebec
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Montreal, Quebec

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Mogford Campbell Associates
Toronto, Ontario

GORDON OSBALDESTON, P.C., O.C.
Senior Fellow
Richard Ivey School of Business
Administration
University of Western Ontario
London, Ontario

PIERRE PAQUETTE
General Secretary
Confederation of National Trade Unions
Montreal, Quebec

MARCEL PEPIN
Montreal, Quebec

ROGER PHILLIPS
President and Chief Executive Officer
IPSCO Inc.
Regina, Saskatchewan

STRUAN ROBERTSON
Deputy Chairman
Central Guaranty Trust Company
Halifax, Nova Scotia

RIX ROGERS
Chief Executive Officer
The Institute for the Prevention of
Child Abuse
Toronto, Ontario

DONALD J. SAVOIE
Clément-Cormier Chair in
Economic Development
Moncton University
Moncton, New Brunswick

KEN W. STICKLAND
President
KenAgra Management Services Ltd.
Edmonton, Alberta

MICHAEL A. SULLIVAN
Chartered Accountant
Summerside, Prince Edward Island

H. GRAHAM WILSON
Burlington, Ontario

KEN WOODS
International Vice-President, Canadian Office
International Brotherhood of
Electrical Workers
Willowdale, Ontario

Foreword

Canadians have been presented, some would say burdened, with several weighty studies of competitiveness issues in the past year – from such diverse sources as the Government of Canada, the Business Council on National Issues, the C. D. Howe Institute, Kodak Canada, and the National Advisory Board on Science and Technology, among others. Each has addressed the problem from a different angle: Professor Michael Porter looked at the performance of firms and industries, whereas the Prosperity Initiative of the federal government is intended to foster a broad consensus on the nature of the problem. But all of them have had a similar message: they agree that Canada is being challenged by rapid developments in global markets and that it must change.

This Statement is no exception. It is a summary of the main findings of the Council's research on productivity, costs, innovation, and trade. It explores why Canadian industry has performed so poorly over the past 20 years. It compares that performance with those of other industrial and newly industrialized nations. It shows that Canada's situation has been slipping relative to that of its trading partners, and that this jeopardizes future living standards. The study describes the feedback between the micro world of management and labour and the macro world of inflation and exchange rates. Its primary conclusion is that Canadians have not responded quickly and effectively enough to the challenges that have been taking place in international markets.

The Council's work shows conclusively that the problems that Canadians face are systemic – rooted in the attitudes of decision makers in all sectors of the economy and at all levels of management and production. There is no single culprit; and unfortunately, there is no new or magic solution.

These findings are important to Canadians, for there is no escaping the fact that the ultimate source of growth in the real incomes of Canadians is increased productivity – that is, the ability to produce more from the same amount of capital, labour, and materials. Productivity growth is also the source of the revenues that Canada can devote to cleaning the environment, improving health and education, providing more economic security for the poor and the unemployed. It has a bearing, therefore, on how well Canadians can manage or reduce social and regional tensions across the country.

This Statement, and the accompanying chart book, present our main research findings and broad policy advice. They will be followed by a more detailed research report and a number of background studies prepared by the project team and outside experts. The project, which was directed by Sunder Magun, was guided by an Advisory Committee composed of three Council members and six outside experts. On behalf of the Council, I wish to thank Peter Brophey, who chaired the committee, and all its members for their advice and support.

Further work by the Council on related topics will include a study of Canada's education and training systems, to be published in the spring of 1992. Two other projects, to be completed in 1993, will examine the new markets and new competitors on the Asia/Pacific Rim, and assess the influence of the public sector on economic performance.

Judith Maxwell
Chairman

Pulling Together

Changes in the global economy, now as on previous occasions in our history, challenge Canadians to respond positively to a new international environment if we are to have acceptable future growth performances. The necessary response will require significant adaptation in our economy to meet international competition.

Report of the Royal Commission on the Economic Union and Development Prospects for Canada (Macdonald Commission), Volume One, p. 58.

Canada's Competitive Position in the World Economy

Introduction

Canada is a wealthy country, rich in both human and natural resources. The incomes earned by its people today are among the highest in the world.

The current high standing is a legacy from previous generations. Over the decades, huge investments have been made in infrastructure. Communications and transportation systems are, for the most part, vast, modern, and efficient, joining together far-flung regions into a highly integrated economic union. A large and mature educational system has been developed. Publicly financed, high-quality health care is available to all Canadians. And for those in need, there is an extensive system of income security. Thanks in part to the extensive trade and direct-investment linkages that have been established with the United States and other industrialized countries – and to traditions of pluralism, democracy, and political stability – Canada has been an economic success story.

Yet the economic stresses of the 1980s have made Canadians aware that the foundations of their success have been shifting – that their economic future is now much less secure than it once was. There has been little improvement in real wages for more than a decade. Jobs and work incomes have become increasingly polarized. Economic growth has slowed down. Many people are finding it difficult to sustain their current living standards, let alone achieve the advances that used to come easily.

As a result, increases in real income frequently seem attainable only by more work, either through longer hours or through having more than one wage-earner in the family. But more work at a decent wage is often unavailable. Despite strong rates of employment growth, full-time permanent jobs were not easy to find during much of the 1980s, and the unemployment rate remained high throughout most of the decade.

In this Statement, we evaluate Canada's ability to maintain and improve its current high standard of living. Why is Canada facing the problems just described? What can be done about them? To answer these questions, we have examined the structural changes that are going on in the global economy and the reactions of Canadians to these transformations. And we have looked at Canada's competitive position in that environment to see why it has changed.

Globalization and the Canadian Economy

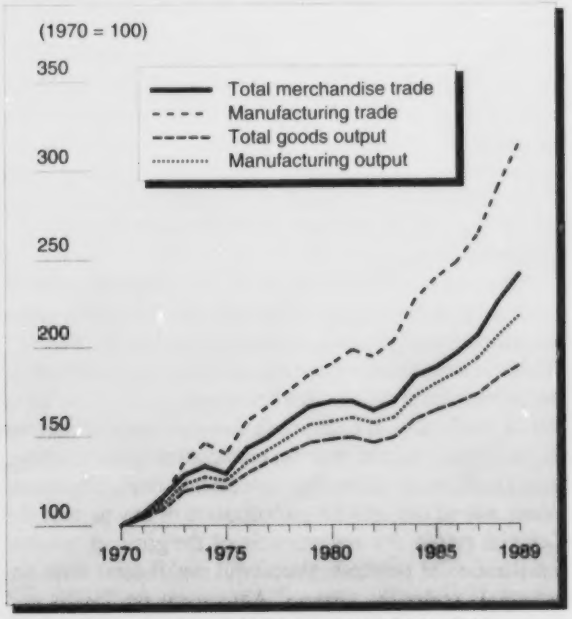
Much of the economic uncertainty that Canadians face finds its roots in the speed of change in the global market. The structure of the world economy has undergone major transformations over the past two decades. Rapid technological changes have caused financial, production, and marketing systems at the local, regional, and national levels to become increasingly linked on a global basis. Regional and national economies have thus become more integrated and interdependent. These changes have altered both the Canadian workplace and the lives of many Canadians.

Three interrelated forces have been central to these events: the technological revolution, the increasing internationalization of business, and trade liberalization. Fast and reliable communications and transportation networks reflect the technological change that has occurred. The increasing role of multinational enterprises, the expansion of various forms of international business cooperation (joint ventures, strategic alliances, technology agreements, marketing agreements, and so on), and the globalization of key parts of the financial system are symptomatic of the growing internationalization of business. Successful multilateral trade negotiations under the General Agreement on Tariffs and Trade (GATT) and the trend towards liberalization of trade at the regional level – as evidenced in the expansion of the European Community, the removal of barriers between the community and the European Free Trade Area, the Canada-U.S. Free-Trade Agreement, and the current talks between Mexico, the United States, and Canada – reflect developments in international trade.

As a result of the interaction of these forces, the volume of world merchandise trade has been growing more rapidly than that of world output (Figure 1). And during the 1980s, the flow of foreign direct investment grew even faster than world merchandise trade (Figure 2) as the activities of multinational firms expanded rapidly, further accelerating global economic integration – a trend that is expected to continue throughout the 1990s. The multinationals increasingly operate with a global perspective; they obtain financing, purchase inputs, and manufacture and sell products in a wide variety of countries. In large part, these very high levels of investment reflect an ongoing effort by multinationals to find, anywhere in the world, sites that will enable production to be carried out as inexpensively as possible, with due consideration for quality, reliability, and other nonprice factors. Such investment is also often motivated by the desire of these firms to locate sufficient production in countries where they wish to sell in order to reduce the risks of being kept out of these markets by protectionist measures.

Figure 1

Volume of world merchandise trade and output, 1970-89



SOURCE Based on data from GATT, *International Trade*, 1990.

These global trends are exerting strong pressures on Canada, affecting jobs, wages, and profits. To remain prosperous, Canadian firms must be able to sell their products to the world; at the same time, governments must provide an environment that makes Canada attractive as a place for businesses, both domestic and foreign, to invest.

During the 1960s and early 1970s, real income per capita (measured as gross domestic product per capita) grew very rapidly in Canada – at about 4 per cent per annum (see box and Figure 3). This rise in the standard of living was fuelled mainly by rapid growth in productivity. It was a period of extraordinary economic advance for all Canadians. It was also an era of growing social consciousness. Publicly financed medical care, the Canada Assistance Plan, the Canada/Quebec Pension Plans, the Guaranteed Income Supplement, and the 1971 reform of the unemployment insurance system were among the landmark measures adopted during this period.

Since the mid-1970s, however, there has been a decline in the growth rate of real income per capita. Even more serious is the fact that this decline has stemmed largely from a slowdown in the growth of productivity. Unless that slowdown reverses itself, average incomes in Canada will fall in the future, relative to those in other countries, and it will become much more difficult for governments to meet social commitments.

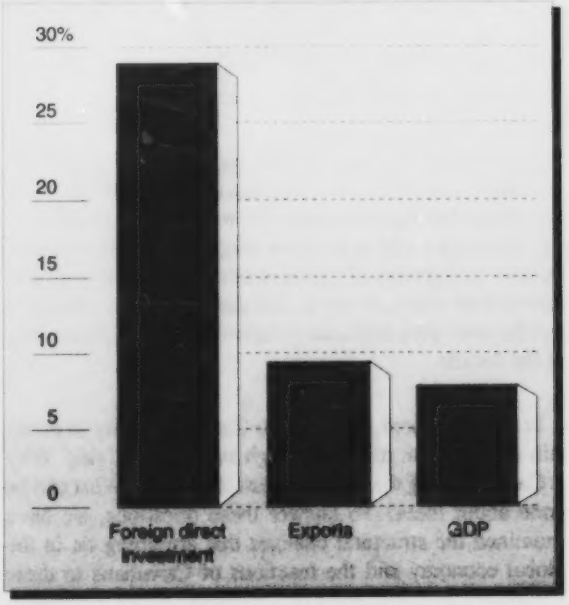
The Challenges Facing Canada

This concern about incomes is being expressed in the current national debate on the state of Canada's international competitiveness. The anxieties about competitiveness have been further magnified by the loss of manufacturing jobs during the recession that began in 1990. The migration of some Canadian firms to the United States has added fuel to the fire.

The free-trade agreement with the United States and, more recently, the implementation of the goods and services tax (GST) have been cited by some as causes of those job losses in manufacturing and of the decline in Canada's competitive position. That explanation is not persuasive, however, because it focuses on relatively recent trends. But the competitiveness problem has been developing over a

Figure 2

Average annual growth in current value of world outflows of foreign direct investment, world exports, and world gross domestic product, 1983-89



SOURCE Data from the United Nations, *World Investment Report*, 1991.

Real incomes and labour productivity

In general, improvements in per-capita real income – that is, gross domestic product (GDP) per person – are determined by increases in the number of people who work, as a proportion of the total population, and in their productivity (defined as GDP per person employed).

Growth in labour productivity, in turn, is influenced by two factors: 1) improvements in the overall efficiency of the production process – total factor productivity, and 2) the growth in capital per employed person (called "capital accumulation").

Canada's per-capita real income and aggregate labour productivity *levels* are very high by international standards. Canada is among the top two or three nations in the world. However, the *growth* in real incomes has declined dramatically since 1973, compared with the period 1962-73.

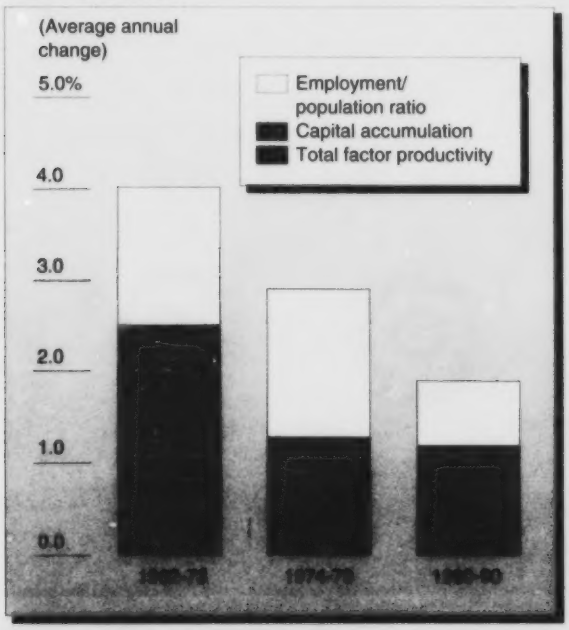
Our analysis suggests that the slower growth in per-capita real incomes in the post-1973 period was *largely* (about 75 per cent) the result of the reduction in the rate of growth of labour productivity. The slowdown in labour productivity, in turn, was *entirely* caused by the slower growth in total factor productivity, not capital accumulation.

The remaining slowdown in the growth rate of per-capita real incomes was caused by the reduction in the growth rate of the employment/population ratio. The slower growth in the proportion of people employed, in turn, was attributable to a smaller rate of decline in the dependency rate (the proportion of people not in the labour force) and an increase in the aggregate unemployment rate.

The link between productivity growth and real incomes was analysed in greater detail by the Council in *The Bottom Line: Technology, Trade, and Income Growth* (Ottawa: Supply and Services Canada, 1983); see pp. 13-16.

Figure 3

Sources of growth in real GDP per capita, Canada, 1962-90



SOURCE Estimates by the Economic Council.

period of some years; it did not just suddenly appear two or three years ago.

Rather, the problem has its roots in the slowness with which Canadians have reacted to changes in the economic environment, both domestically and internationally, over the past decade and a half. The signs of weakness have been present for some time, but it was easy to overlook them when the North American economy was growing strongly. The recessionary events of the past few years, however, have stripped away some of the veneer that helped to hide the deterioration in Canada's economic performance. The facts can now be seen with increasing clarity; the serious – and perhaps disastrous – consequences of not facing up to them are also becoming more and more evident.

During the 1981-82 recession, weak commodity prices and other factors helped to lower the value of the Canadian dollar from 86 cents U.S. in 1980 to 72 cents in 1986. In retrospect, we can see that this enabled Canadian manufacturers and resource producers to reap large transitory gains. They enjoyed strong exports and good profits. But at the same time, many of them failed to turn these temporary gains into permanent ones. They did not do enough to strengthen their future productivity position.

Since 1986, the value of the Canadian dollar has risen. In January 1992, it was in the 86-88 cents U.S. range. Many business and labour leaders now argue that this "high" value has made selling Canadian products increasingly difficult, both at home and abroad, especially in the United States.

And indeed, as we shall see later on, Canada's cost position relative to the United States has been adversely affected by the upward movement of the dollar.

Beyond the difficulties created by the substantial appreciation of the exchange rate, however – and of greater long-term significance – lies the problem of slower productivity growth and faster growth in hourly compensation. These two factors together accounted for virtually all of the deterioration in Canada's cost position relative to the United States during the 1980s. The faster rate of growth of labour compensation, in turn, was mainly a reflection of higher rates of consumer price inflation in Canada.

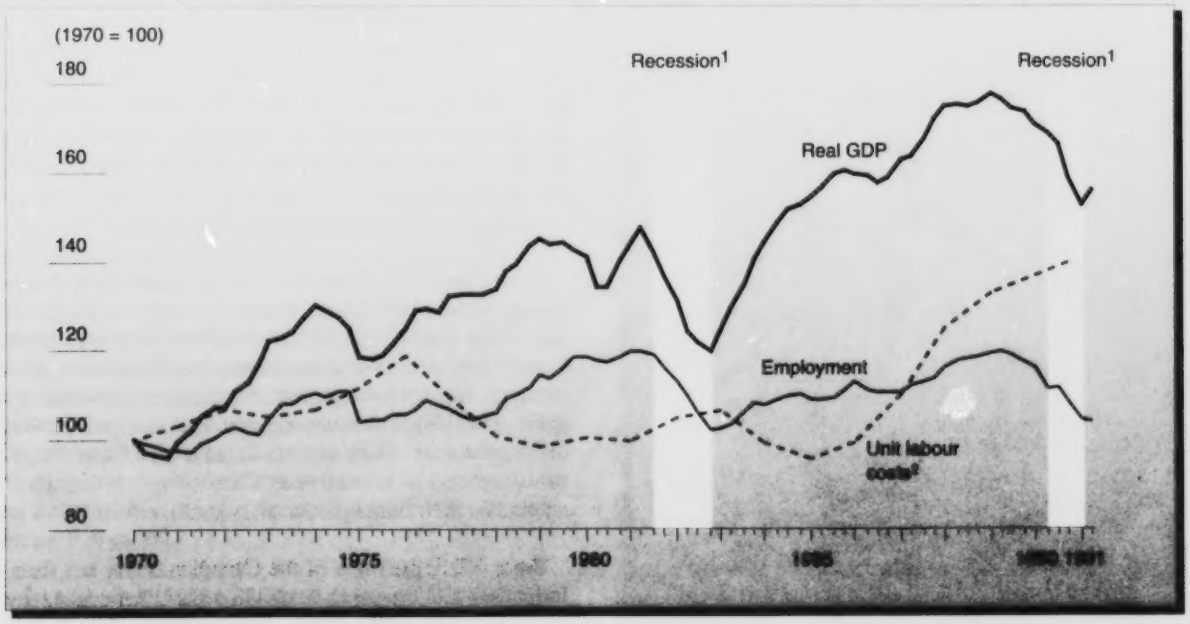
The slower rate of productivity growth is especially troubling. Productivity in most of the other large industrial countries has grown at a faster rate than in Canada over the past 10 years. And the problem has been worsening, especially in that part of the economy most exposed to international competition: during the period 1986-90, real output per hour in the Canadian manufacturing sector grew at an average annual rate of only 0.25 per cent, compared with 2.5 per cent during the preceding six-year period. This stagnation of productivity growth occurred in almost every industry in the manufacturing sector. It has contributed significantly to the slow growth in real incomes for more than a decade, and it has had an adverse effect on employment opportunities.

Thus the erosion of Canada's manufacturing cost position reflects a trend that began well before the trade agreement with the United States came into force in January 1989 and before the emergence of the recession in April 1990. As we shall see later on, it began in the early 1980s, but it was initially obscured by the decline in the exchange rate. By 1986-87, the deterioration, especially relative to the United States, was showing up in the statistics. Since then, Canadian unit labour costs in manufacturing have risen by over 40 per cent relative to U.S. costs. The effects of this took several years to be felt, because changes in costs do not immediately affect output and employment. But they were apparent by 1989 (Figure 4).

From the first quarter of 1989 to the second quarter of 1991, the manufacturing sector lost about 273,000 jobs (a 13-per-cent decline). Only half of these job losses took place

Figure 4

Manufacturing employment, real GDP, and relative unit labour costs, Canada, 1970-91



1 The recession periods shown are for the total economy.
2 Measured as Canadian costs relative to U.S. costs. Note that prices, output, and employment respond to changes in costs with a lag.
SOURCE Estimates by the Economic Council, based on data from Statistics Canada and the U.S. Bureau of Labor Statistics.

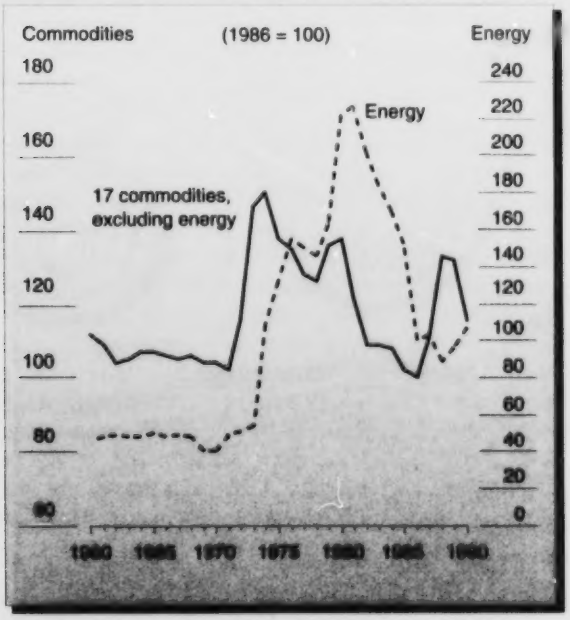
during the period usually viewed as recessionary (i.e., from the second quarter of 1990 to the second quarter of 1991). Some jobs were lost because of cyclical factors and may return as the economy recovers. However, a significant proportion of job losses resulted from the excessive increases in unit costs. Many of the jobs that were lost will not return.

Thus the crisis in the Canadian manufacturing sector is not simply a short-term cyclical phenomenon. It is much deeper in scope and reflects a lack of effective adjustment to global changes during the 1980s.

Costs are not the only handicap that the manufacturing sector must contend with. For not only must Canadians be able to sell their products competitively, they must sell products that the world wants. Historically, Canada's comparative advantage has been in natural resources – especially forest and mineral products – and in resource-based manufacturing products, such as paper and newsprint. Canadians have attained their high standard of living by using their resource base efficiently and selling their products abroad.

Figure 5

Change in real commodity prices,[1] Canada, 1960-90



1 Commodity export prices relative to U.S. wholesale price index for finished goods; the commodities include five grains, seven metals, two nonmetallic minerals, three forestry products, and three energy products.

SOURCE Estimates by the Economic Council.

But Canada is unlikely to be able to sustain this position in the future. Relative to the prices of manufactured products, commodity prices (excluding those of energy products) have been declining for much of the past two decades (Figure 5). In part, this downward trend can be attributed to greater competition from new resource suppliers, especially in the Third World, and to the growing substitution of man-made advanced materials for resource materials. At the same time, world manufacturing trade has been growing faster than trade in primary commodities. And within the manufacturing sector, trade has been growing most rapidly in those segments which are not based on natural resources. These developments have been compounded by the fact that productivity improvements have been even lower in resource-extracting industries than in manufacturing.

And there is still another handicap. Economic growth, productivity gains, and globalization have been driven by technological innovation. Moreover, the momentum of technological change has accelerated in recent years. Product-development cycles, in particular, have become much shorter. Yet, despite the critical importance of technological change as one of the driving forces of international competitiveness, Canada has a relatively poor science and technology performance. It lags behind other industrialized countries in the adoption and diffusion of advanced manufacturing technologies and has an inadequate commitment to research and development (R&D); in addition, there are increasing concerns about elements of the country's different educational systems, including an apparent decline in interest in science and engineering. Canada also has other deficiencies in its human-resource development efforts, including a failure to keep up with the training requirements associated with the new jobs that are emerging. All of these factors may be linked to the weak innovation process in Canada.

Notwithstanding these unfavourable trends, Canadians do have an advantage: they start from a strong position. Productivity and wage *levels* are high. Canada is just about at the front of the pack globally. However, its lead has been shrinking because of the slow growth in productivity. Canadians must understand that their leading position is being undermined. And they must act.

Factors in Assessing Canada's International Competitiveness

Competitiveness is a multidimensional concept that reflects the general "health" of a country's economy. For the most part, competitiveness is a *relative* concept: a

country's competitive position is measured by comparing its performance with that of its major trading partners.

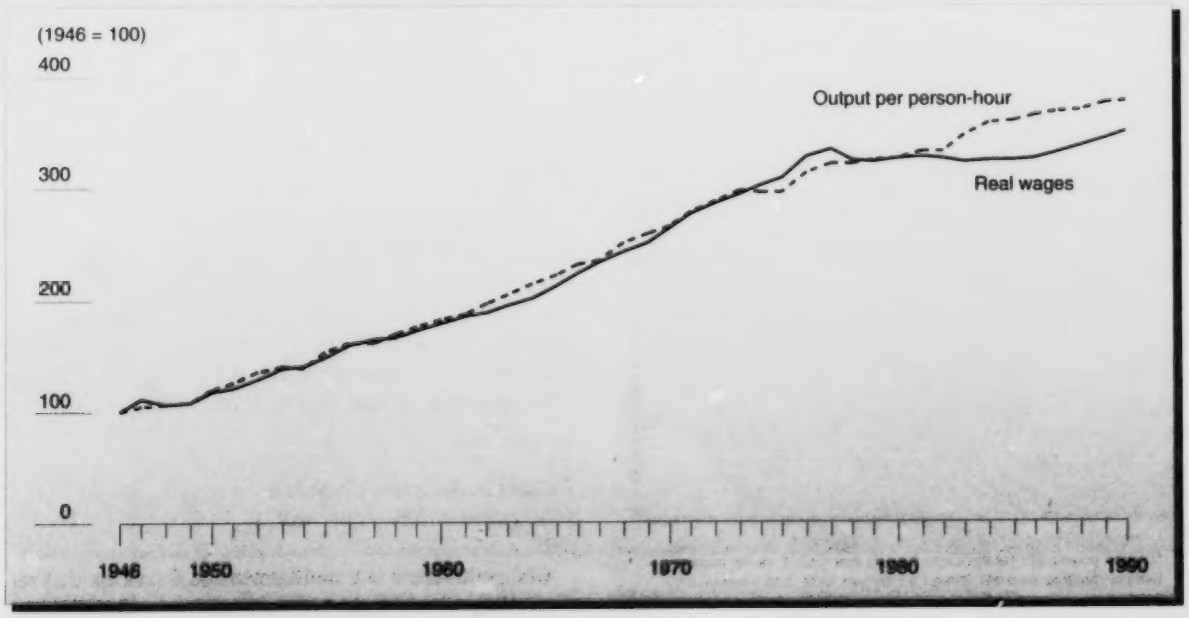
The goal of economic activity is to improve the well-being of people – that is, to advance their living standards, as measured by the level and growth of real income per person or per family. At the national level, many factors affect income per person, such as the country's endowment of natural resources, the quality of labour and capital, and the efficiency with which these factors are employed in the production of goods and services. These factors also determine the nation's comparative advantage and ultimately contribute to its ability to compete in the world market.

The concept of competitiveness can be most easily grasped at the level of the individual firm. One can diagnose the changes in a firm's competitiveness by examining the trends in its market share, profits, and stock price.

These firm-level indicators cannot, however, be used to measure a country's competitiveness in the international market. For example, a country's export share in the world market does not properly measure its competitive ability, because that indicator is distorted by such factors as fluctuations in exchange rates and differences in economic growth across countries, which could be temporarily unrelated to competitiveness. In fact, several commonly used, trade-based indicators – such as changes in trade balances – suffer from such flaws. These indicators may reveal a short-run trend, but they do not necessarily signal a change in international competitiveness, which is essentially a long-term phenomenon.

National competitiveness is better defined by reference to broader indicators that show the extent to which a country's involvement in global markets through trade, investment, and technology flows leads to growth in real incomes. The crucial link between these economic activities and national economic well-being is provided by productivity. Growth in productivity is by far the single most important factor determining the growth in real wages. Productivity growth generates the added production of goods and services that underpins increased wages. Real wage growth that is not backed up by such additional output cannot be sustained for long periods: it simply results in additional wages chasing a constant amount of goods and services, thus forcing up prices – in other words, it becomes a wage/price spiral. Hence trends in real wages must follow trends in pro-

Figure 6
Trend in business-sector real wages and productivity, Canada, 1946-90



SOURCE Estimates by the Economic Council, based on data from Statistics Canada.

ductivity. For these reasons, it is not surprising to find that the real consumer wage in Canada – that is, the nominal wage adjusted for changes in the consumer price index – has moved broadly in tandem with labour productivity over the last 45 years (Figure 6).

As a consequence, rising export shares or an improved trade balance are appropriate measures of competitiveness only if they are associated with increased productivity and real income growth. Thus a nation's productivity growth, relative to that of its major competitors, is the critical factor in determining its long-term ability to compete in global markets. Naturally, there are numerous other factors that influence productivity and real-income growth. The most important are: the level of innovation activity, which has to do with the creation and appropriation of technological opportunities through R&D investment and technology diffusion; investments in physical and human capital; and shifts in national comparative advantage towards higher-value-added activities.

Our principal task in this Statement is to explain why Canada's productivity and real-income growth has declined since the mid-1970s and to recommend measures to improve the country's performance in both areas. To that end, we examine the interrelationships between four broad factors that heavily influence a country's competitive position: its comparative advantage and international trade; its productivity; its relative cost position; and its industrial innovation effort.

Fundamental to our explanation of the productivity slowdown in this Statement is a sense that Canadians are too often reluctant to embrace and indeed, on occasion, to even accept change. This theme – this aversion to change – emerges from every aspect of our research. It appears when we look at the causes of Canada's poor performance with respect to productivity growth. We see its effects when we examine indicators of the innovation effort. The consequences can be discerned in Canada's unchanging comparative advantage in a period when its traditional areas of specialization will likely provide an insufficient base for future prosperity. And we see it in the fact that business, labour, and government often seem unable to pull together – to function as a team when teamwork is called for.

If Canadians are unwilling to modify their attitudes and actions, their competitive position will be eroded. They cannot afford to be complacent. Increasing the flexibility of the economy so that it can adapt continuously to the evolving needs of world markets is an urgent and overriding task.

Trade Flows and Comparative Advantage

International trade helps to promote higher living standards. It enables each country to specialize and export goods and services that it produces relatively less expensively and to import those which it produces relatively more expensively. Such specialization leads to improvements in productivity and real incomes by facilitating a more efficient allocation of labour, capital, and natural resources, and the achievement of scale economies. Trade and the associated competitive pressures at home and in export markets may also have a positive influence on productivity and real incomes by promoting rationalization, better management practices, the adoption and diffusion of state-of-the-art technology, and so on. As we shall be stressing throughout this Statement, it is essentially improvements in productivity that enable real incomes to rise.

In practice, a nation's ability to take advantage of the opportunities provided by world trade will depend critically on two elements. First, the products that it sells must be the kinds of products that the world wants. If a country specializes in goods and services for which world demand is falling steadily, then real incomes could decline because of a loss in that country's "terms of trade" as the average price of what it exports falls relative to the average price of what it imports. The reduced world demand for its output could also have a negative impact on its productivity and real incomes through loss of scale economies.

Second, the products must meet customers' standards with respect to price, quality, and service. For example, a sharp deterioration in the cost structure of an industry will, over time, be translated into substantially higher prices and thus will normally lead to a reduction in the demand for its exports and an increase in its imports.

Trade patterns are also influenced by other factors. Foreign direct-investment linkages, for example, can increase trade flows within a firm or within an industry, as plants in one country provide products for plants in another. Institutional arrangements such as the Auto Pact also influence trade flows. Economic and socio-cultural linkages, whether expressed formally in trading arrangements such as the European Community or the Canada-U.S. Free-Trade Agreement, or informally as in the Asia/Pacific region, will increase trade within a region. An additional important factor is that a country with a large absolute-cost advantage over its trading partners will increase its share of the global merchandise market, irrespective of the trend in its costs relative to its trading partners.

Canada relies heavily on international trade because of its relatively small domestic market. It exports around

28 per cent of the goods and services it produces, and it imports a similar proportion of what it consumes. As a result, Canada's continued access to world markets and its ability to compete in terms of price, quality, service, and new products is vital to maintain and improve standards of living.

In examining these issues, we focus on a number of elements:

- the broad changes that have occurred in world trade over the past 20 years;
- the links between these trends and the evolving pattern of Canada's trade flows;
- the influence of global and Canadian trade patterns and trends on changes in Canada's share of world merchandise exports;
- Canada's comparative advantage position in relation to world trade, and its implications for future improvements of standards of living; and
- the influence of Canada's cost structure and of other factors – such as intra-industry trade and regional integration – on trade.

As we shall see, the results of this examination are not entirely reassuring in terms of what they imply for the future of Canadian trade and living standards.

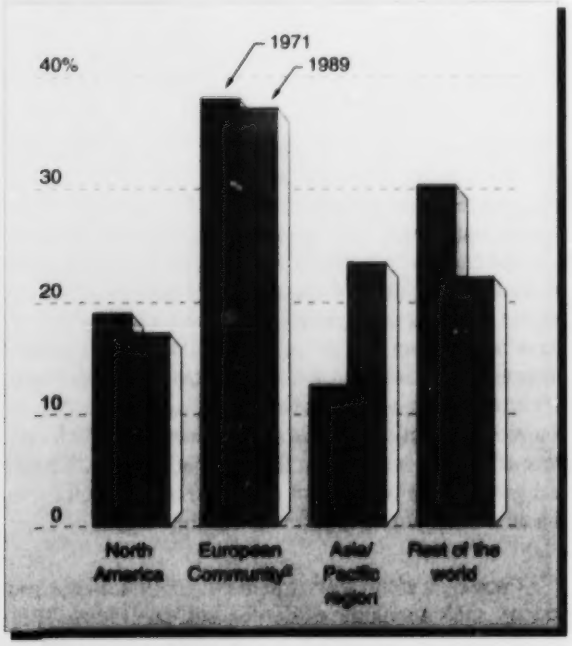
The Changing Patterns of World Trade

The rapid growth of international trade is one of the major economic developments of the past 20 years. Exports have grown much faster than production – a sign that world economies are becoming more integrated in response to changing technology and business structures, and to a more liberal trading environment. The pattern of international trade has also been shifting. One shift is reflected in the dramatic changes in the economic clout of major regions. Among the key developments in interregional trade has been a large drop in the relative share of exports from the developing countries of Latin America and Africa, and from the Soviet Union and eastern Europe (all included in "rest of the world" in Figure 7). The weight of North America (including Mexico) in world trade declined more modestly – from 19 per cent in 1971 to 17 per cent in 1989. The decline in the North American share does not mean, however, that North American exports have fallen; on the contrary, they rose from 5 per cent of regional GDP in 1971 to 9 per cent in 1989. Rather, the decline reflects the jump from 13 per cent in 1971 to almost 25 per cent in 1989 in the share of world exports recorded by the Asia/Pacific countries (i.e., Japan, Hong Kong, Singapore, South Korea, Taiwan, Malaysia, Thailand, Indonesia, the Philippines, China, Australia, and New Zealand). Exports from that region to all other regions have grown, particularly in North America. In 1989, more than one third of all North American imports originated in the Asia/Pacific region, compared with just one fifth in 1971.

A second important shift has been the growing regionalization of world trade. This is reflected in the significant increase in trade within the European Community. But it is in the Asia/Pacific region that the largest growth in regionalization has occurred – with the proportion of intra-regional exports rising from 34 to 41 per cent between 1971 and 1989 – as the newly emerging economies of the region have moved from supplying raw materials and labour-intensive goods to producing components and finished products for firms based in Japan and elsewhere in the region. In North America, however, where market

Figure 7

Distribution of world exports,[1] by region, 1971 and 1989

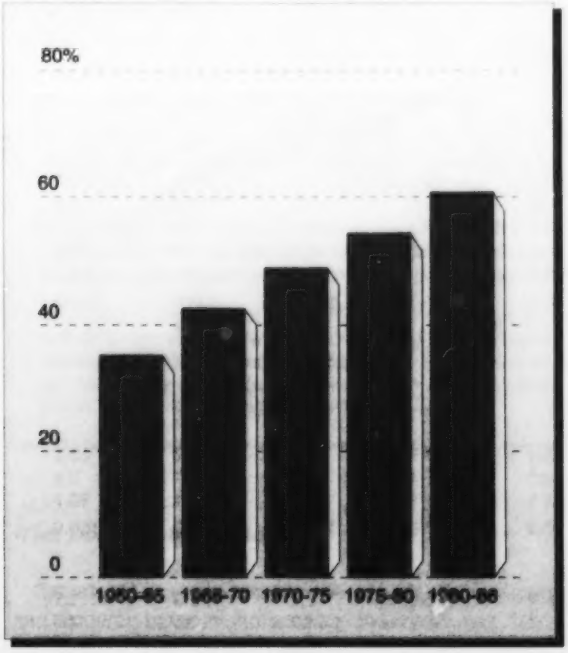


1 Including intra-regional trade.
2 The data for 1971 have been adjusted to include the 12 countries that belonged to the community in 1989.

SOURCE Estimates by the Economic Council.

Figure 8

Average share of manufactured products in total world merchandise exports, 1950-86[1]



1 Based on data expressed in constant dollars.
SOURCE Based on data from *European Economy*, March 1989.

integration was already well advanced, intra-regional exports rose only slightly – from 40 per cent in 1971 to 41 per cent in 1989. This share may increase as Mexico opens up its economy.

The composition of trade has also changed. The share of manufactured goods in the *volume* of world trade has increased steadily over the past 40 years or so, rising to 60 per cent in 1980-86 (Figure 8). The growing importance of this trade was accompanied by a general increase in the price of manufactured goods relative to that of resource products. As a result, in 1989 manufactured goods accounted for about 80 per cent of world trade in goods, on a *value* basis.

Finally, the data on world trade in commercial services – which include transportation, tourism, telecommunications, insurance, banking, and other professional services – suggest that it has grown at about the same pace as trade in goods over the last 20 years. The GATT has estimated that the share of commercial services in total world exports was 19 per cent in 1989 – unchanged from its 1970 level – but it is well to recall that measurement problems make it difficult to have a precise idea of the amount of trade in those services.

Trends in Canada's Foreign Trade

The importance of trade to the Canadian economy has been increasing over the past few decades. In 1975, merchandise trade (exports plus imports of goods only) in real terms represented about 30 per cent of GDP. Today, that figure has climbed to about 50 per cent; both imports and exports have risen at a similar pace.

With Whom Does Canada Trade?

The United States has long been, and remains, by far, Canada's most important trading partner. While its share as a source of Canadian imports has barely changed in recent years – declining from 72 per cent in 1981 to just under 71 per cent in 1989 – the importance of the U.S. market for Canadian exports has grown over the same period – from about 66 per cent of the total in 1981 to 74 per cent at the end of the decade (Table 1). Another characteristic of Canada's trade with the United States is that it is largely influenced by the presence of multinational firms, especially in those parts of the manufacturing sector that are not based on natural resources (see box on page 11).

A number of other trends are worth pointing out. In particular, the growing importance of the Asia/Pacific countries in the world economy is reflected in the significant expansion of Canadian trade with that region. While the newly industrialized countries (NICs) of Asia still account for only a tiny proportion of Canada's exports, that share rose from 0.4 per cent in 1971 to 2.8 per cent in 1989. At the same time, the share of imports from these countries rose from 1.4 to 4.7 per cent. Although Japan's importance as a trading partner also grew during that period, the share of the Asian NICs has risen at a faster pace, and collectively, they may soon be as important as Japan in Canada's international trade.

In contrast, there has been a decline in the share of trade with the European Community. Although the 12-nation group is currently the world's largest trading bloc, with a 40-per-cent share of world trade – a share that has remained roughly the same since 1971 – its relative importance as a market for Canadian goods has fallen markedly. While the proportion of imports from this region rose somewhat during the 1980s, it remains well below the figure recorded in the early 1970s.

Table 1

Geographic and industrial distribution of Canadian trade, 1971, 1981, and 1989

	Canadian exports			Canadian imports		
	1971	1981	1989	1971	1981	1989
	(Per cent)					
Geographic distribution of total trade						
United States	68.5	65.6	73.7	71.0	72.0	70.6
Japan	4.6	5.6	6.5	5.3	5.4	5.8
European Community	14.5	11.1	8.3	12.1	8.6	10.4
Asian NICs	0.4	1.3	2.8	1.4	2.9	4.7
Rest of the world	12.0	16.5	8.8	10.3	11.1	8.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Industrial distribution of total trade,[1] by country or region						
United States						
Primary	17.4	26.4	15.6	13.6	15.2	29.8
Resource-based manufacturing	31.5	29.6	27.1	11.5	11.7	9.4
Nonresource-based manufacturing	51.1	44.1	57.3	74.9	73.1	60.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Japan						
Primary	68.4	60.9	55.0	2.5	2.3	1.1
Resource-based manufacturing	25.4	31.6	37.2	18.9	12.5	4.6
Nonresource-based manufacturing	6.2	7.5	7.8	78.6	85.2	94.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
European Community						
Primary	45.5	37.6	29.4	4.4	10.4	13.8
Resource-based manufacturing	39.1	37.8	42.1	20.1	26.2	19.6
Nonresource-based manufacturing	15.4	24.6	28.5	75.6	63.4	66.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Asian NICs						
Primary	29.0	33.7	43.8	11.4	6.6	3.1
Resource-based manufacturing	39.1	33.4	29.2	13.4	8.6	6.2
Nonresource-based manufacturing	31.9	32.8	27.0	75.2	84.8	90.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
Rest of the world						
Primary	42.8	41.7	42.2	43.2	56.8	31.7
Resource-based manufacturing	27.1	20.3	22.9	30.1	20.7	21.9
Nonresource-based manufacturing	30.1	38.0	34.9	26.7	22.5	46.4
Total	100.0	100.0	100.0	100.0	100.0	100.0
World						
Primary	26.9	32.1	22.4	14.9	18.5	25.4
Resource-based manufacturing	31.8	29.1	28.7	14.9	13.9	11.1
Nonresource-based manufacturing	41.2	38.7	48.9	70.2	67.6	63.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

1 The primary sector includes agriculture, fishing, forestry, and mining. Resource-based manufacturing includes the following industries: food, beverages, and tobacco; lumber and furniture; paper and publishing; petroleum refining; nonmetallic minerals; and primary metal products. Nonresource-based manufacturing includes all other manufacturing industries (e.g., electrical equipment, machinery and equipment, etc.).

Source Estimates by the Economic Council, based on Statistics Canada's World Trade Database.

Canada's trade and the multinationals

Foreign direct-investment linkages play an important role in shaping Canada's trade flows with the United States. Our analysis of the trade performance of foreign- and domestic-controlled firms is based on 1987 data concerning 711 establishments in the manufacturing sector, half of which were foreign-controlled multinational enterprises (MNEs), the other half consisting of domestic-controlled firms.

Approximately 75 per cent of manufacturing exports in our sample are attributable to foreign-controlled MNEs, which also account for about 88 per cent of manufactured imports. The industry breakdown shows that the prominence of MNEs in trade is associated both with their concentration in a few industries with a disproportionate amount of trade (such as the motor-vehicle industry) and with the fact that MNEs account for the bulk of trading activity in most industries. Our analysis also indicates that the propensity to export of foreign-controlled MNEs is nearly twice that of domestic-controlled firms. Their propensity to import is about five times greater.

In our sample, the intra-firm imports of foreign-controlled firms represented about 40 per cent of their total manufacturing imports – significantly more than the 18-per-cent share for domestic-controlled firms. The degree of reliance on intra-firm trade is greater in high-technology and knowledge-intensive industries and in industries characterized by greater vertical specialization.

The outward orientation of foreign MNEs provides strong evidence that for the most part, they are not miniature branch-plant replicas of their foreign parents that have come to this country only to serve the Canadian market. Furthermore, the greater ratio of intra-firm imports to total imports exhibited by foreign MNEs suggests that they are probably relatively more specialized, particularly in high-technology and knowledge-intensive industries, than domestic firms. Finally, foreign MNEs engage more in intra-industry trade, while domestic firms engage more in interindustry trade.

What Does Canada Trade?

Canada relies much more on the exports of its resource and resource-based manufacturing industries than do the other large industrialized countries. In 1989, these exports accounted for about 51 per cent of the Canadian total, compared with about 35 per cent in both the United States and the European Community. Resource-based manufacturing industries include food, beverages, and tobacco; wood; paper products; primary metals; nonmetallic minerals; and refined petroleum.

This reliance on resource products varies across export destinations. Almost three fifths of Canadian sales to the United States consists of nonresource-based manufacturing products. In the case of Japan, less than 10 per cent of Canada's exports fall into this category, but the composition of Canadian shipments to that country appears to be shifting somewhat from primary products to resource-based manufacturing products. Canadian exports to the Asian NICs are also concentrated on products from the resource-based industries, although the proportion is smaller than in the case of sales to Japan. The decline in the importance of the European Community as a market for Canada's exports has been accompanied by a reduction in the concentration of resource-based products and an increase in technology- and skill-based exports.

The proportion of manufactured products (excluding those made principally from the natural-resource base) in Canada's total merchandise exports rose notably during the 1980s – from 39 per cent in 1981 to 49 per cent in 1989. This was essentially attributable to large volume increases in sales of machinery and equipment, and motor vehicles and parts.

The proportion of Canadian imports made up of manufactured products is about the same as that of exports, although Canada imports relatively more nonresource-based manufactured products. For example, in 1989 nonelectrical machinery and electrical products accounted for one third of total manufactured imports, compared with 17 per cent for exports.

These differences are also notable when one compares the composition of Canada's exports and imports with different countries or regions. The greatest similarity is found in our trade with the United States: manufactured imports accounted for about 70 per cent of total imports from that country in 1989 – a figure that was not too different from the 84-per-cent share of manufactured products in Canadian exports to that country. In the case of the Asian NICs and Japan, however, Canada's import and export patterns are quite different. Canada imports almost exclusively manufactured products from these countries, especially machinery and equipment.

Although the value of Canada's trade in services has increased substantially in recent decades, it appears not to have grown as rapidly as that of merchandise trade. According to published statistics, service exports as a proportion of total exports fell from around 18 per cent in 1961 to

13 per cent in 1989, while the proportion of service imports declined from 23 to 18 per cent over the same period. It is possible, however, that the system for gathering statistics is not quite as efficient at capturing service exports as it is for merchandise exports. In addition, it is likely that a growing share of service inputs are now embedded in Canada's merchandise exports (see Economic Council of Canada, *Employment in the Service Economy*, p. 50). For both of these reasons, the above data probably underestimate the importance of services in total exports.

In addition to the overall trend in service exports, the latter have undergone an important shift in composition. The share of business services in service exports rose from 14 per cent in 1961 to 35 per cent in 1989. The corresponding figures for imports are 22 and 39 per cent, respectively.

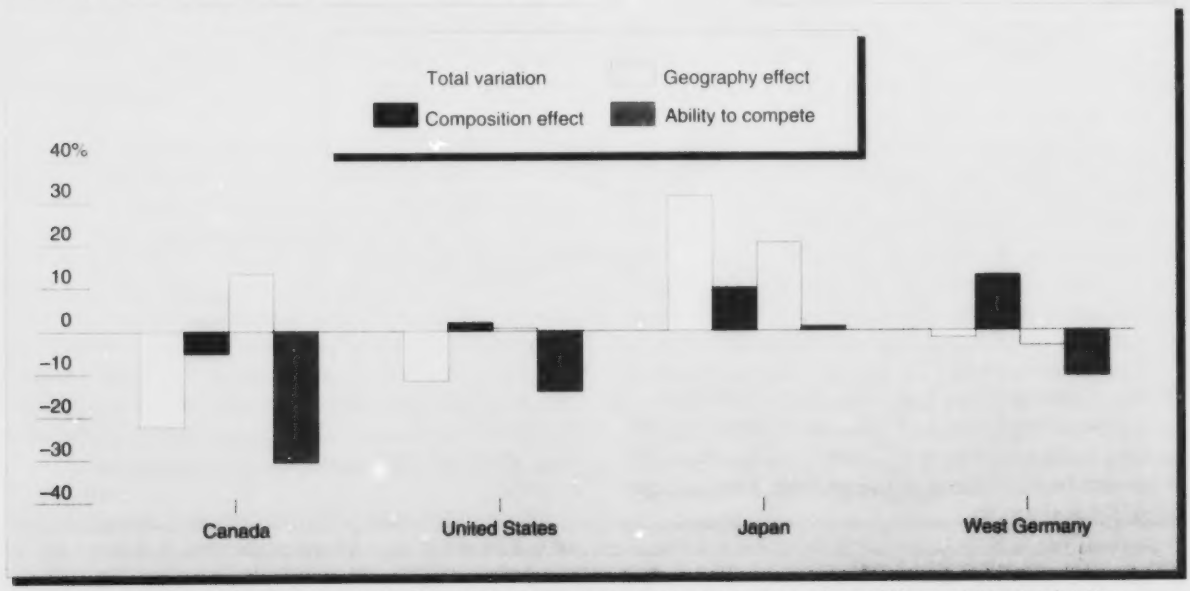
Explaining Changes in Export Market Shares

Canada's share of world trade fell from 5.3 per cent in 1971 to 4.0 per cent in 1989. To what extent can this decline be explained by the trade patterns and trends discussed above? And to what extent is it accounted for by other factors? To answer these questions, the evolution of Canada's share of world exports was decomposed into three components: its product/industry composition; its geographical distribution; and a third factor referred to here as "Canada's ability to compete in foreign markets."

A country may gain or lose a certain share of world exports because its exports are concentrated in products for which world demand is growing relatively quickly or relatively slowly. That could also happen if its exports are destined for markets that are relatively more or less dynamic than the world average. After these two elements – trade composition and geographic distribution – have been taken into account, the residual is referred to as the country's "ability to compete in foreign markets." This embodies the effect of a number of influences, such as export prices and exchange-rate variations, international differences in quality and new-product creation and in how exports are marketed and financed, the ability to fulfil foreign orders without undue delays, and so on. Essentially, Canada's ability to compete reflects changes in its domestic supply conditions relative to those in other countries.

Figure 9

Components of the change in world export shares[1] between 1971-73 and 1987-89, Canada, United States, Japan, and West Germany



1 The figure shows the difference between actual and hypothetical changes; a hypothetical increase is one that would have maintained market share.
SOURCE Estimates by the Economic Council.

The results of this analysis for Canada and the three leading industrialized countries – the United States, Japan, and West Germany – are summarized in Figure 9. The influence of each factor is expressed as a proportion of the total variation between the two periods examined, 1971-73 and 1987-89 (shown by the white bars in the figure). The results show that the "composition effect" (i.e., the concentration of Canadian exports in resource products and resource-based manufactured goods) had a moderately downward impact on Canada's share of the world market. Conversely, the "geography" effect (i.e., the weight and level of activity in Canada's major export market, the United States) had a positive effect because U.S. imports grew rapidly during the 1980s and this worked to Canada's advantage. Thus the overall loss in Canada's share resulted largely from a deterioration in its "ability to compete." The latter development was not only the result of the inevitable gains in market share achieved by countries with much lower costs – for example, the Asian NICs, China, etc. – but also, as we shall see later on, of a number of domestic factors that eroded Canada's cost structure relative to the United States.

Canada's Comparative Advantage

Our analysis of the composition of Canadian exports in relation to trends in world trade reveals that they are concentrated in resource products. This concentration is seen as contributing to the decline in Canada's share of world trade. It is the implications of such specialization for the prospect of future improvements in Canada's standard of living that we wish to assess here.

Over the longer term, a nation tends to specialize in products and services that it produces *relatively* more efficiently than its trading partners – that is, those products and services which reflect its comparative advantage. Similarly, it imports those products and services which its trading partners produce at relatively lower cost and which therefore give them a comparative advantage of their own. A country's comparative advantage depends on its endowment of natural resources, its accumulation of human and physical capital, its technology, and its economic organization. For example, nations with rich endowments of natural resources, such as Canada and Australia, tend to specialize in products and industries that depend on them; countries with an abundant supply of unskilled labour tend to specialize in labour-intensive products, and so on.

Hence, given the strong competition prevailing in international markets, a country's trading patterns will reveal its comparative advantage. The comparative-advantage indicator that we use here is calculated as the ratio of a country's share of world exports of a particular product to that same country's share of total world merchandise exports. If the ratio is greater than 1, that country is then considered to be specialized or to have a comparative advantage in this particular product; a ratio lower than 1 indicates a comparative disadvantage.

Table 2 shows that Canada's comparative advantage is essentially related to the extraction and processing of resource products – pulp and paper, wood products, nonferrous metals, chemical products, fertilizers, and so on. In fact, with the exception of the automotive sector, where a comparative advantage in Canada's favour flowed initially from the Auto Pact, power-generating machinery and equipment is the only product category in which Canada has a comparative advantage that is not strictly based on primary resources. Moreover, the concentration of resource and resource-based products is also strong in categories (such as furniture, rubber, and metal products – not shown in the table) for which the comparative advantage indicator rose significantly between the early 1970s and the late 1980s, without reaching the threshold value of 1.

The growth in exports of the other manufacturing industries (i.e., those not based on natural resources) were not sufficient, relative to increases in world trade of the same products, to improve Canada's comparative advantage in those areas.[1] In particular, labour-intensive products (such as footwear, textile, and clothing products) ranked at the bottom of Canada's comparative-advantage scale.

A comparison with the other large industrialized countries or with the Asian NICs shows that they generally have a broader range of comparative advantage in the manufacturing sector than does Canada; the contrast is even more striking when the automotive sector is excluded from the Canadian data. The difference between Canada and other industrialized countries is also pronounced in the fast-growing sector of high-tech products (mainly machinery and scientific equipment). The concentration on resource exports places Canada in a group that includes Sweden, Australia, and New Zealand – all countries that are richly endowed with natural resources, although Sweden has a more diversified export structure than the others.

Canada, along with Italy, Sweden, and the United States, also belongs to a group of countries whose comparative advantage has changed little over the past 20 years. A slow rate of change in a country's comparative-advantage structure is not in itself a cause for concern if its citizens enjoy high and rising living standards. What is needed, then, is to ascertain where Canada's comparative advantage may lead it in the future.

Table 2

Revealed comparative advantage[1] in selected commodity groups,[2] Canada, 1971-73 and 1987-89

	1971-73	1987-89
	(Ratio)	
Commodities for which Canada's comparative advantage was the greatest in 1987-89[3]		
Pulp and waste paper	6.8	7.9
Cork and wood	3.8	5.2
Electric current	3.7	4.3
Paper, paperboard, and articles made of paper pulp, paper, or paperboard	4.0	3.6
Gas, natural and manufactured	5.5	3.2
Crude fertilizers and crude minerals	2.8	3.0
Metalliferous ores and metal scrap	4.0	2.8
Manufactured fertilizers	2.5	2.7
Road vehicles	2.7	2.7
Coal, coke, and briquettes	0.8	2.5
Cereals and cereal preparations	2.3	2.5
Nonferrous metals	2.5	2.0
Fish, crustaceans, and molluscs	2.2	1.8
Oil seeds and oleaginous fruits	1.7	1.7
Live animals	1.0	1.5
Cork and wood manufactures	1.5	1.5
Inorganic chemicals	1.1	1.4
Animal oils and fats	0.9	1.4
Power-generating machinery and equipment	1.8	1.3
Hides, skins and furskins, raw	0.8	1.1
Beverages[3]	1.4	0.7
Commodities for which Canada's comparative disadvantage was the greatest in 1987-89		
Footwear	0.1	0.1
Travel goods, handbags	0.2	0.1
Articles of apparel and clothing accessories	0.2	0.1
Animal fats and oils, processed	0.1	0.1
Dyeing, tanning, and colouring materials	0.1	0.2

1 If the ratio is greater than 1, Canada had a comparative advantage during the period considered; a ratio lower than 1 indicates a comparative disadvantage.
2 From the two-digit Standard International Trade Classification.
3 The beverage industry is the only one that enjoyed a comparative advantage in 1971-73 but displayed a comparative disadvantage in 1987-89.
Source Estimates by the Economic Council, based on data from Statistics Canada.

While Canada still specializes very heavily in resource-based products, the other members of the Group of 7 (or G-7, which comprises the United States, Japan, Germany, France, Italy, Canada, and the United Kingdom) have a structure of comparative advantage that is more closely aligned with the changing structure of world demand. In a sense, that is perhaps not surprising. After all, Canada has attained and maintained its present state of affluence by relying to a large extent on the extraction and processing of primary products. Many jobs in the primary and processing industries are well paid, and many people in isolated areas of the country depend on such jobs. Moreover, the very theory of comparative advantage entails the notion that different countries tend to specialize in different lines of products.

Yet there are good reasons to believe that Canada may be unable to sustain its present relatively high living standards if it maintains its current dependence on the natural-resource sector; at the very least, some major improvements in the performance of the resource sector will be necessary.

What are those reasons? First, not only are primary products becoming progressively less important in world trade, the share of resource-processing industries in manufacturing trade is also declining. This reflects the fact that, as world incomes rise, the demand for resource products grows less rapidly than that for other products. In addition, the quickening pace of technical innovation has led to the substitution of synthetic for resource-based products. As a consequence, Canadian producers of raw materials will have a strong incentive to find new markets or diversify into new products.

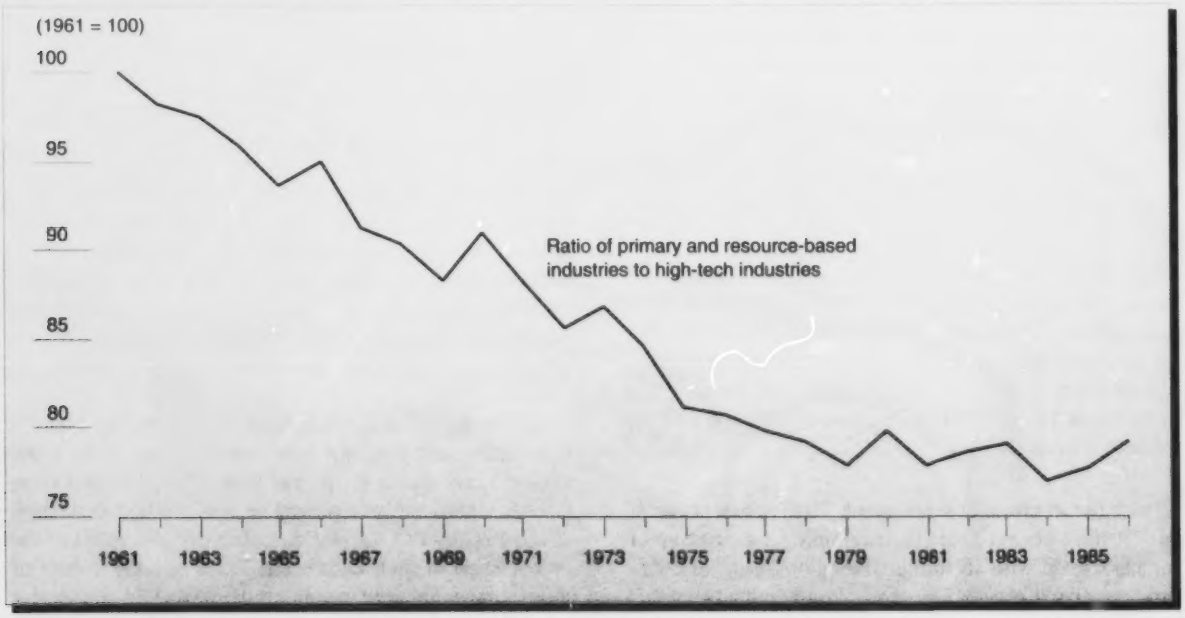
A second important and related consideration is the fall in the relative price of resource commodities over the past two decades (see Figure 5). If this trend continues, Canada's comparative advantage will be confined to products that, on average and over time, it will be able to sell for progressively smaller amounts of the products it buys on world markets. Moreover, should the countries that have emerged from the collapse of the Soviet Union successfully modernize their economies over the next decade or two, given the very rich resource base that some of them have, the supply of these resource commodities will grow, and the downward pressure on resource prices could intensify.

A third concern is that total factor productivity in the primary and processing industries has grown, on average, at a significantly slower pace than in other manufacturing industries, especially in the high-tech sector (Figure 10). Ultimately, this weaker productivity performance will mean that growth in wages and profits will be slower in resource-based industries than elsewhere. In turn, such developments are likely to translate into a decline in employment in those industries, adding to adjustment pressures, especially in rural communities and single-industry towns.

An additional consideration is that the industries based on resource extraction and on first-stage processing are often those which cause the greatest environmental damage and are of greatest concern to consumers. As awareness of such problems grows, the pressures on these industries will intensify. Thus new investment will be required not only to improve productivity and lower costs, but also to meet environmental standards. These additional requirements

Figure 10

Trend in relative total factor productivity,[1] Canada, 1961-86



1 Measured by dividing TFP for primary industries (agriculture, fishing, forestry, and mining) and resource-based manufacturing industries (food, beverages, and tobacco, paper and publishing, lumber and furniture, petroleum refining, nonmetallic minerals, primary metals) by that for high-tech industries (machinery and transportation equipment industries).

Source Estimates by the Economic Council.

could put Canada at a disadvantage against other countries that specialize in economic activities less likely to cause environmental damage.

These trends in world trade will increase the pressure on Canadian resource-based industries to improve their productivity performance at the extraction, processing, and manufacturing levels. These industries face an urgent need to restructure their productive capacity. In this regard, a recent study observes that "few of Canada's resource-based industries have upgraded or widened their sources of advantage" (Michael E. Porter, *Canada at the Crossroads: The Reality of a New Competitive Environment*, October 1991, p. 38). We believe that within the resource sector, firms must be encouraged to shift to higher-productivity activities. In all sectors, firms must engage in continuous innovation in order to improve their position in world markets.

As well, new areas of specialization must be developed. With skills and technology being increasingly important components of production, the need for a dynamic and continuously evolving comparative advantage is real.

Canada's Cost Position and Trade Flows

In examining the impact of Canada's recent cost performance on trade flows, a variety of other factors that determine trading relationships – such as intra-regional trade, foreign direct-investment linkages, and, of course, comparative advantage – must also be considered. We have analysed the effects of these factors on Canada's trade in 14 manufacturing industries with four markets: the United States, the European Community, Japan, and the Asian NICs.

Apart from costs, which are dealt with in greater detail below, many factors have played a role in shaping Canada's trade patterns. These include the levels of protection (tariff and nontariff barriers in Canada and abroad); intra-firm, intra-industry, and intra-regional trade; and the fact that many countries (the NICs, for example) have a large absolute-cost advantage.

Trade barriers need little comment. Tariff and/or nontariff barriers have played a role in determining the structure of Canada's trade with all four countries or groups of countries mentioned above. For example, Canadian nontariff barriers in such industries as clothing and textiles have acted as a significant constraint on imports of these products from the Asian NICs (as well as from many of the countries of the developing world).

The growth of intra-regional trade within the European Community and among the countries of the Asia/Pacific region reduced Canada's manufacturing exports to those two areas by an average of 1.5 to 2.0 per cent per year during the period 1971-86, as Canadian products were replaced by those from within the regions themselves – particularly in paper and publishing, primary metals, nonelectrical machinery, and transportation equipment industries – a phenomenon referred to as the "trade-diversion effect."

The large direct-investment linkages between Canada and the United States have played a notable part in that trading relationship. The automotive industry provides the most obvious and formally institutionalized example of this, but such links exist in all Canadian industries. Their importance for Canada's bilateral trade with the United States suggests that the expansion of direct-investment links with other countries could well enhance trade linkages with them as well.

The large productivity improvements achieved by the Asian NICs and Japan have led these countries to increase their exports to Canada. Their huge absolute-cost advantage and the speed with which they are closing the technological gap with the industrialized countries imply that Canada's deficit on manufactured products with the Asian NICs will continue to rise in coming years.

Cost Effectiveness and Trade

Cost factors strongly influenced both the composition and the geographic distribution of Canadian trade flows during the 1980s. If production costs in a given Canadian industry are higher than those in the same industry elsewhere, then Canadian producers will experience difficulties in selling. Exports will decrease and, depending on transportation costs, imports may rise. For a country such as Canada, where the small size of the domestic market makes it imperative for producers to sell abroad, the importance of cost efficiency for trade flows is evident.

As noted earlier, the Canadian manufacturing sector's costs increased by about 40 per cent more than those in the United States during the period 1986-90; at the same time, Canada significantly improved its cost position in relation to other regions of the world, essentially as a result of the appreciation of their currencies. What was the impact of these cost changes on Canada's trade flows? To answer this question, the Council used the historical relationships between trade flows and relative costs to produce a hypothetical estimate of the likely effect of cost changes on manufacturing exports and imports.

While a short-term increase in relative costs can be absorbed by producers, a longer-run rise is not normally sustainable. As a consequence, even though over the short run trade flows may deviate from movements in relative costs, the latter will eventually be translated into price movements. The full direct impact of such changes in relative costs could take up to five years to work itself through trade flows.

Based on the historical relationship between trade flows, costs, and other factors, the deterioration in the cost position of Canadian manufacturing industries vis-à-vis their U.S. counterparts during the period 1986-90 suggests that the value of Canadian manufactured exports to the United States "should" fall by about 37 per cent by 1994, compared with a situation in which no changes in relative costs had occurred (the "base case"). These hypothetical impacts reinforce the belief that the current difficulties of the Canadian manufacturing industries are largely related to the deterioration of their cost position in the U.S. market (Figure 11).

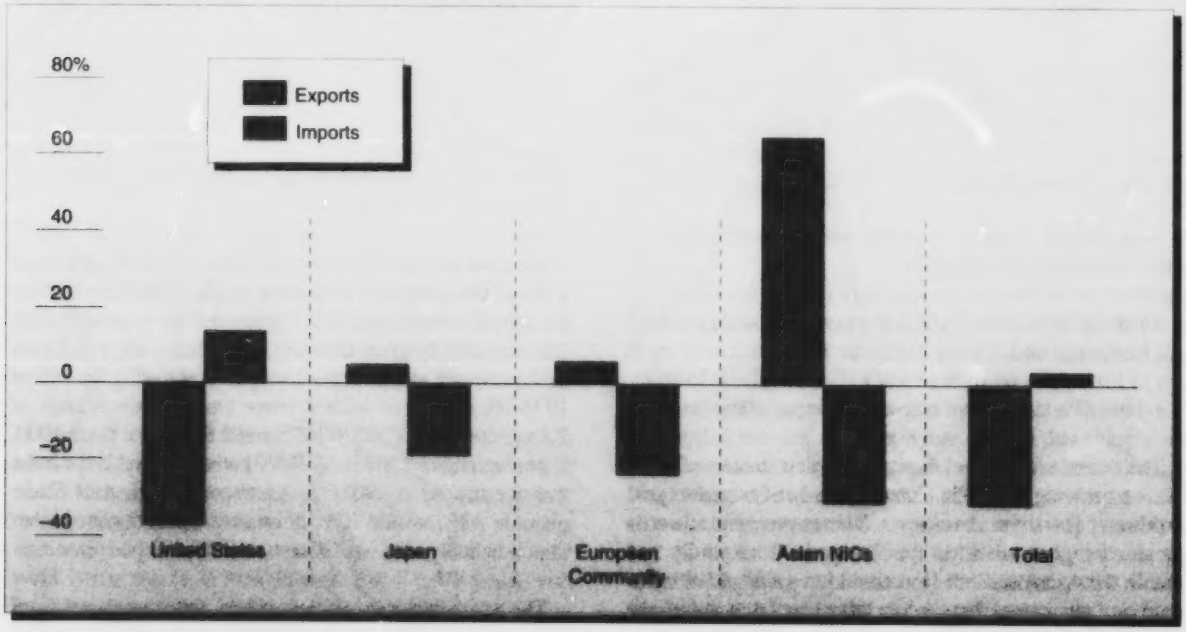
This decline should also be hypothetically offset, in part, by the significantly increased Canadian exports to Japan, the European Community, and the Asian NICs resulting from improvements in Canadian costs relative to those regions. However, as the U.S. market currently accounts for about 85 per cent of Canada's total exports of manufactured products to the four regions, the total impact of the relative-cost changes would still represent a substantial reduction (about 31 per cent) in total Canadian manufactured exports.

The changes in relative costs also mean that Canadian imports from the United States should rise, while those from other regions fall. The net impact on imports is an estimated 3.5-per-cent increase.[2]

Obviously these impacts might not be fully realized, as they are based on the important assumption that trade is influenced only by relative costs. But they also highlight the harmful effects that changes in Canada's costs could

Figure 11

Hypothetical effects (by 1994) of recent changes in Canada's cost position on its manufacturing trade with selected countries/regions[1]



1 The impact shown here represents only direct (first-round) effects. It does not take into account changes in demand, the feedback effects of changes in real incomes and in the exchange rate on trade flows, the effects of relative-cost changes after 1990, the effects of the other factors that also influence Canada's trade flows and patterns.

SOURCE Estimates by the Economic Council.

have on its trading relationships and its current-account balance, and ultimately on employment in its manufacturing sector. Moreover, the industrial composition of the manufacturing output losses that have been observed since 1989 is strongly correlated with the pattern of effects predicted by our hypothetical analysis. In addition, the growth in Canada's real exports of goods and services was substantially slower than that of the other G-7 countries during the years 1987 to 1990, in contrast with the superior performance recorded by Canada between 1982 and 1986.

Conclusions

We see four mutually reinforcing reasons for concern about Canada's capacity to generate high-paying jobs and a healthy growth in real incomes in the future. The structure of Canadian trade is dominated by products and industries:

- that are becoming relatively less important in world trade;
- that are facing a decline in relative prices;
- that are experiencing relatively slow productivity growth; and
- that are likely to face growing environmental problems.

Despite these unfavourable trends, there is little evidence that the pattern of Canadian trade is adjusting. To turn this situation around, the following changes are essential:

- a general increase in productivity growth relative to other industrialized countries;
- shifts to higher-productivity activities within the resource sector; and
- the development of new areas of specialization.

The recent evolution of factors other than cost trends suggests a growing deficit in Canada's trade of manufactured products, for several reasons. The movement towards greater integration within the European Community and within the Asia/Pacific region could have a negative influence on Canadian exports, while large absolute-cost advantages will likely continue to spur exports from the Asian NICs to Canada. In addition, the serious structural problems in the U.S. economy – a large budget deficit and an intractable current-account deficit – could lead to a slowdown in U.S. domestic demand over the medium term and could therefore dampen prospects for Canadian manufactured exports to that country. Such developments would adversely affect Canada's future productivity and real-income prospects.

However, an increase in foreign direct-investment flows, especially with the Asia/Pacific region, could enhance Canada's trade linkages with countries other than the United States. In turn, this could facilitate a diversification of the industrial pattern and geographic orientation of Canadian trade.

Large changes in cost effectiveness will have a significant influence on output and employment in Canada's traded-goods sectors through their impact on imports and exports. For example, our analysis suggests that in itself, the recent (1986-90) deterioration in Canada's cost position could lower total manufactured exports by 31 per cent and increase imports by about 4 per cent over a five-year period, compared with a situation in which the cost structure does not change. These estimates suggest that losses in output and employment in the manufacturing sector since 1989 have resulted largely from the deterioration in Canada's cost effectiveness. These problems will persist unless Canada's cost position is improved. Clearly, the preferable option for achieving such improvements would be through increases in Canada's relative productivity levels.

Productivity Performance

Productivity performance is the key determinant of improvements in real income; it is also a key factor in improving trade performance.

Like other industrialized countries, Canada experienced a deep and pervasive decline in productivity growth after the oil-price shock of 1973. Aggregate labour productivity (as measured by gross domestic product per employed person) grew at a mere 1.2 per cent per year during the period 1974-90, compared with average annual growth rates of 2.4 per cent from 1962 to 1973 and 2.5 per cent since 1900. If productivity growth in 1974-90 had continued at the same average rate as in 1962-73, the average income of Canadians in 1990 would have been about 24 per cent higher than it actually was – a difference of $6,100 per person.

The manufacturing sector, where the globalization of trade and production has turned international competition into a fierce struggle for market share, has become a source of special concern. In this sector, Canadian productivity growth lagged behind that of the other large industrial coun-

tries during the period 1974-90. In particular, the gap between Canadian and U.S. manufacturing productivity levels widened considerably during the 1980s.

Our analysis points to a single underlying theme that explains much of the slowdown and the weaker manufacturing performance in this country relative to the other G-7 countries – that is, the failure of the Canadian economy to make quick and strong structural adjustments in response to shocks (e.g., oil-price increases) and to competitive pressures, notwithstanding the high level of firm turnover and labour-market volatility that occurred.[3] That failure to adjust results in part from wrong signals given by public policy. We shall return to this issue in the final section of this Statement.

In analysing Canada's productivity performance, we

- compare the levels recorded in this country with those obtained elsewhere, and compare those achieved by Canadian- and foreign-controlled manufacturing firms;
- examine the possible causes of the slowdown in Canadian productivity since 1973;
- analyse the causes of the growing gap between Canadian and U.S. productivity performance in manufacturing; and
- conclude with a summary of the main findings of our research.

Relative Productivity Levels

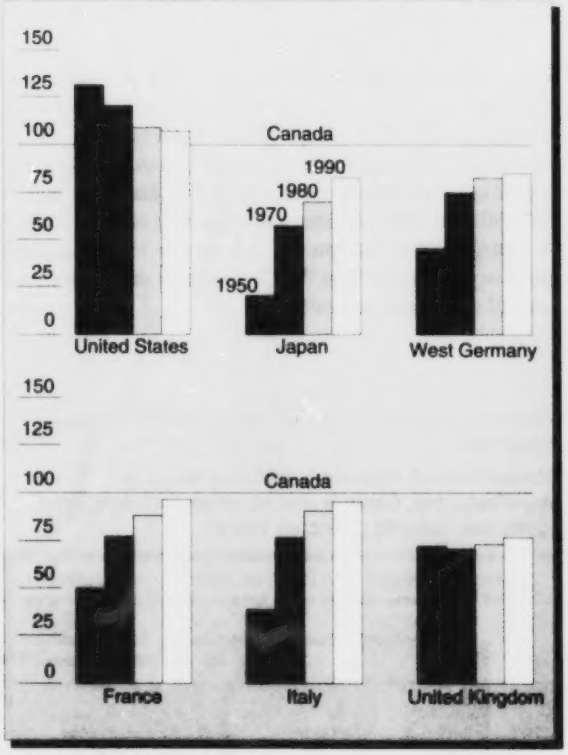
Canada has substantially improved its *overall levels* of labour productivity and real per-capita income relative to the United States in the postwar period (Figure 12). In 1950, U.S. productivity was 32 per cent greater than Canada's, but that figure was only 7 per cent in 1990. On a worldwide basis, Canada is among the top two or three nations.

The gap narrowed during the 1980s because Canada's labour productivity growth was substantially better than that of the United States in a number of industries – transportation, storage, and communications; construction; mining; and utilities. This advance more than offset the relatively weak performance in manufacturing and in wholesale and retail trade and other services during the decade.

But it is the manufacturing sector's relative productivity and cost performance that will have the greatest impact on Canada's ability to meet successfully the growing competitive challenge from other nations, for two main reasons. First, as noted earlier, manufacturing exports constitute a large (close to 80 per cent) and growing proportion of the value of world trade. If Canada is to be successful in export sales, it must be able to produce goods efficiently. In this regard, we saw in the previous section that sharply increasing manufacturing costs are having an adverse impact on production and employment. Second, in the past the manufacturing sector has contributed relatively more than any other part of the economy to productivity growth despite the growing importance of the service sector. While the linkages between the goods and service sectors have been growing, the impact of goods production on the demand for services is greater than the impact of service production on the demand for goods (see *Employment in the Service Economy*, p. 8).

Figure 12

Comparison of aggregate labour productivity levels,[1] Canada and six other industrialized countries, 1950-90 (selected years)



1 Real GDP per employed person.

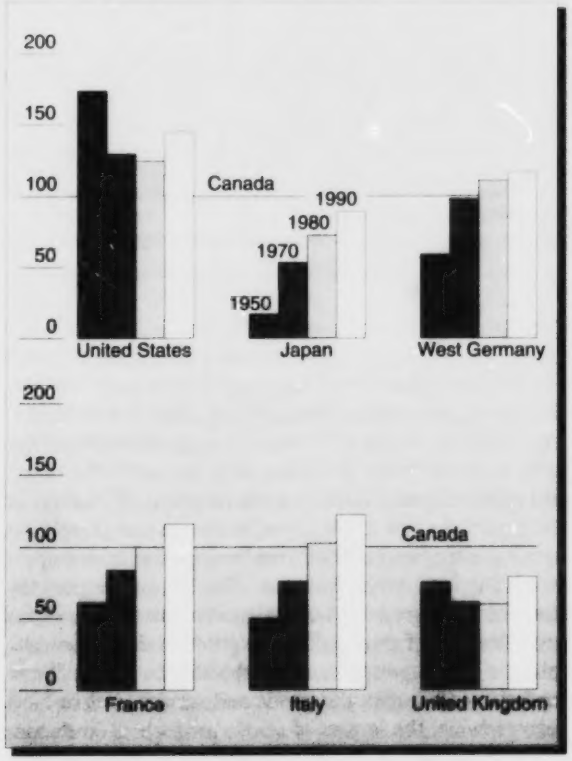
SOURCE Estimates by the Economic Council, based on data from the U.S. Bureau of Labor Statistics.

The gap between Canadian and U.S. manufacturing labour productivity narrowed substantially during the period 1950-80 (Figure 13), only to widen significantly in the 1980s. The U.S. level was 24 per cent higher in 1980; by 1990 the gap had increased to 45 per cent, roughly back to what it was in 1960.

The setback experienced during the 1980s was pervasive, affecting three quarters of the 18 manufacturing industries displayed in Table 3. Despite this recent negative trend, eight of the Canadian industries were able to achieve gains in their *relative* labour productivity during the longer period 1961-90. The most obvious and important example is that of transportation equipment, where the rationalization associated with the Auto Pact led to large increases in the scale of production in Canada.

Figure 13

Comparison of labour productivity levels[1] in manufacturing, Canada and six other industrialized countries, 1950-90 (selected years)



1 Output per hour.

SOURCE Estimates by the Economic Council, based on data from Statistics Canada and from the U.S. Bureau of Labor Statistics.

When productivity growth rates for the U.S. farming, forestry, and fisheries industries are aggregated, they are substantially higher than the corresponding Canadian rate for the period 1961-86. The opposite is true in mining, where the Canadian growth was stronger. Overall, Canadian productivity growth rates in the natural-resource sector were roughly similar to those in the United States, but they were not enough to offset the relative deterioration experienced by Canadian manufacturing.

Canadian manufacturing industries are not losing ground just to their U.S. counterparts but also to those in the other G-7 countries. For example, the productivity levels recorded in West Germany, France, and Italy had reached or surpassed the Canadian level by 1980 and have continued to gain ground since then. Japanese manufacturing productivity now stands at almost 90 per cent of the Canadian level, having risen from about 53 per cent in 1970. The newly industrialized economies of Asia (Hong Kong, Singapore, Taiwan, and South Korea) have also dramatically improved their productivity in relation to Canada.

Foreign-controlled firms account for about 50 per cent of total sales and employment in the Canadian manufacturing sector. Their labour productivity level (as measured by value-added per employee) was, on average, 20 per cent higher than that of Canadian-controlled establishments during the period 1985-88. Over half of this gap can be attributed to differences in capital, energy, and R&D intensities. As for the remaining gap, this could be accounted for by any of several factors, including differences in management training and practices, easier access to technology and know-how, and the differential impact of public policy on competition levels. With respect to that last factor, we note that the productivity gap between foreign- and Canadian-controlled establishments tends to be largest in industries that are heavily protected by tariff and nontariff barriers.

Why the Slowdown Occurred

In examining the causes of the productivity slowdown, we first look at the total business sector – manufacturing, the primary sector, and the service sector – and then focus on the manufacturing sector. Table 4 shows that the slowdown was pronounced in the overall business sector, using both total factor productivity and labour productivity as measurements. Moreover, the slowdown was widespread. In nearly two thirds of manufacturing industries and in three of the six service industries, total factor productivity growth was actually slower in the 1980s than in the 1970s.

What are the causes of the productivity slowdown since 1973? They have been studied extensively in Canada and

Table 3

Output per person-hour in U.S. manufacturing relative to Canada, by industry, 1961, 1980, and 1990

	1961	1980	1990[1]	Change 1990/1980
		(Canada = 100)		(Per cent)
Nonelectrical machinery[2]	83	75	199	165
Miscellaneous	151	155	197	27
Rubber and plastic products	199	126	160	27
Fabricated metals	152	126	160	27
Chemicals and chemical products	133	127	158	24
Paper and allied products	86	112	138	23
Nonmetallic minerals	122	94	113	20
Furniture and fixtures	106	122	146	20
Food, beverages, and tobacco	127	130	153	18
Clothing	106	110	128	16
Textiles	108	89	97	9
Printing and publishing	141	121	129	7
Leather and leather products	161	157	166	6
Transportation equipment	222	133	132	–1
Wood products	117	144	129	–10
Petroleum and coal products	217	203	172	–15
Electrical machinery[2]	149	145	122	–16
Primary metals	135	137	104	–24
All manufacturing	142	124	145	17

1 Preliminary estimates. Data are not available for individual industries for the period 1988-90; as a consequence, the trends in productivity gaps were projected on the assumption that the relation between Canadian and U.S. productivity growth rates for individual industries was the same as that for "all manufacturing," for which data are available.
2 In the U.S. data, computers are included in nonelectrical machinery, while in the Canadian data they are included in electrical machinery.
Source Estimates by the Economic Council, based on unpublished data from the U.S. Bureau of Labor Statistics.

Table 4

Average annual growth in productivity, by major sector, Canada, 1962-90

	Total factor productivity[1]		Labour productivity[2]	
	1962-73	1974-90	1962-73	1974-90
		(Per cent)		
Manufacturing	1.3	0.2*	4.5	1.7
Primary sector[3]	2.1	–0.6*	7.6	1.0
Service sector[4]	1.1	0.4*	2.5	1.3
Total business sector	2.6	0.7	4.0	1.4

*1974-86.
1 Based on real gross output, except for the business sector, where productivity is based on real value-added.
2 Real GDP per hour.
3 Includes agriculture, fishing, forestry, and mining.
4 Includes construction; transportation, storage, and communications; utilities; wholesale and retail trade; finance, insurance, and real estate; and community, business, and personal services.
Source Estimates by the Economic Council, based on data from Statistics Canada.

elsewhere, but no consensus has been reached.[4] Nevertheless, several studies done in Canada and the United States have suggested four factors as being among the most likely culprits: weak demand conditions, leading to lower capacity

utilization rates; sharp increases in real energy prices; adverse interindustry shifts; and a slower rate of capital accumulation. While there is no agreement about the relative importance of each of these factors, it is believed that, together, they more than offset the beneficial effects of three other factors: the growth in "trend productivity" (see below), growth in international trade, and growth in domestic innovation.

The Council's researchers used regression analysis, which enabled them to develop statistical relationships between productivity growth and various explanatory variables for each of the Canadian industries studied. Similar equations were defined for the U.S., West German, and Japanese manufacturing industries. The Council's findings are shown in Table 5 and summarized below. In general, they are in line with what other researchers have noted. Weak demand conditions (lower capacity utilization), the sharp increase in real energy prices and shifts in resources from industries with high productivity levels and high growth rates are among the factors explaining the slowdown. The Council's research did not, however, find slower capital accumulation to be a problem but did note a lower rate of substitution of material inputs for labour. Trade pressures, domestic innovation, and trend productivity (underlying productive efficiency) did not contribute to the productivity slowdown.

An improvement in trend productivity captures two distinct effects. One is the advantage of being able to absorb new technology and production practices that have been successfully developed and used elsewhere; the second is the influence of such factors as the beneficial nature of changes in the quality of inputs used in the production process (e.g., better-educated and better-skilled workers, better-quality steel, or better management practices). Since trend productivity growth remained more or less constant during the period 1962-85, by definition it could not have contributed to the slowdown observed in the business sector during the 1970s and 1980s; in the manufacturing sector, its effects were positive.

The pressures of international trade, as measured by the growth in import penetration and export orientation, made

Table 5

Sources of labour productivity growth and slowdown, Canada, 1966-73 and 1974-85

	Growth				Slowdown,[1] 1966-73/1974-85	
	Business sector		Manufacturing sector			
	1966-73	1974-85	1966-73	1974-85	Business sector	Manufacturing sector
	(Per cent)					
Trend productivity	43	118	45	70	–1	–9
Trade pressures[2]	5	16	17	28	0	–4
Domestic innovation[3]	4	20	13	21	–5	–5
Real energy prices	8	–34	7	–18	32	62
Capacity utilization	18	–19	4	8	39	–5
Interindustry shifts in capital and labour inputs	8	–13	...	...	21	...
Input substitution[4]	14	17	18	3	12	49
Real exchange rate	–1	–7	–4	–11	2	12
Total	100	100	100	100	100	100

Note Figures may not add up to totals because of rounding.

... Figures not appropriate or not applicable.

1 The slowdown is measured as the difference in the average growth rate of labour productivity during the period 1974-85, relative to the period 1966-73. The figures show the estimated contribution of each factor to the slowdown. A minus sign indicates a positive contribution to productivity growth between the two periods.

2 Import penetration in domestic markets and competition against foreign producers in foreign markets.

3 Proxied by R&D intensity.

4 Substitution of other inputs for labour.

Source Estimates by the Economic Council.

a small but positive contribution to the productivity growth of the overall business sector, with a stronger effect on the manufacturing sector's productivity. In addition, Canadian manufacturing industries with higher levels of tariff and nontariff protection tend to have lower labour productivity levels; the converse is also true.

The role of domestic innovation in productivity growth is complex and does not easily lend itself to measurement. Nevertheless, using R&D effort as a proxy, we have estimated that innovation made an important contribution (approximately 10 to 20 per cent) to productivity growth in the manufacturing sector between 1966-73 and 1974-85.

As for the role played by changes in labour quality in the productivity slowdown, there is conflicting evidence. On the positive side, changes in the age/gender composition of the labour force have made a small positive contribution. Another positive factor has been the increase in the average number of years of schooling recorded over the past two to three decades. The weight of the latter factor probably more than offsets evidence of a small decline in the educational achievement of Canadian students for a given number of years of schooling. (The relevant research here will be discussed in our forthcoming Statement on Canadian education.) Also of concern is Canada's continuing weak performance in the areas of skill development and on-the-job training – a concern that applies to management as well as to labour. Taking all of these factors together, however, it appears unlikely that labour quality has been a reason for declining productivity.

Interpreting the Results

In devising policies that promote growth in productivity, it is important to understand why the factors cited above had an adverse impact. Unfortunately, regression analysis is of little help here. From past research by the Council and by others, however, we believe that three of the explanatory factors – changes in capacity utilization, interindustry resource shifts, and labour substitution – were interrelated to a great extent. And the fourth factor that we have identified – the energy price shocks – was the indirect cause that set the whole process of change in motion.

The sharp increases in oil prices in 1972-73 (and again in 1979) effectively entailed a reduction in the real incomes and real wealth of the industrialized world. However, governments in many countries attempted to avoid adapting to the new reality. They chose not to slow down consumption growth, even though quick adjustments were called for. Instead, they responded with expansionary fiscal policies, accompanied initially by monetary accommodation. This led, ultimately, to an acceleration in the rate of inflation worldwide. The shift to strongly restrictive fiscal and monetary policies that occurred during the early 1980s in response to the second oil-price shock and to double-digit inflation sharply increased real interest rates and depressed demand conditions in Canada and elsewhere.

The two oil-price shocks and the subsequent policy reactions appear to have created persistent conditions of inflation and depressed demand conditions, reducing the benefits from scale economies and causing weak output growth in the industrialized world. These developments, in turn, had a negative impact on capacity utilization. And the distorted signals about relative prices arising from the acceleration of inflation had adverse consequences for resource allocation and input substitution. Poor economic conditions, coupled with participation rates that were rising in response to the weakening of real income growth, also encouraged a decline in the rate of input substitution. Productivity growth suffered; and a vicious cycle resulted.

In retrospect, it can be seen that by attempting to shield Canadians from a reduction in real incomes, the policy response to the first oil-price shock retarded the necessary adjustments in the economy and postponed the conditions for strong, stable, and noninflationary growth. By the early 1980s, central banks in Canada and elsewhere were taking strong action to wring inflation out of the system. But their task was made all the more difficult because of the poor trade-off between the goals of stable prices and good economic growth over the short to medium term – a symptom of inflexibility. The Council's past research suggests that during the 1980s, a variety of market and institutional rigidities in Canada severely constrained the capacity of monetary policy to control inflation without at the same time reducing real output.

If one lesson can be learned from the post-1973 experience, it is that economies must be more flexible in the face of a relative-price shock or of other adverse external developments. Government policies that improve the flexibility of response to supply- and demand-side shocks and to growing international competition will improve the inflation/growth trade-off and – ultimately – the conditions for productivity growth.

Why the Slowdown in Manufacturing Was More Pronounced in Canada

We have seen what factors caused the productivity slowdown in Canada. But why is it that Canadian manufacturing

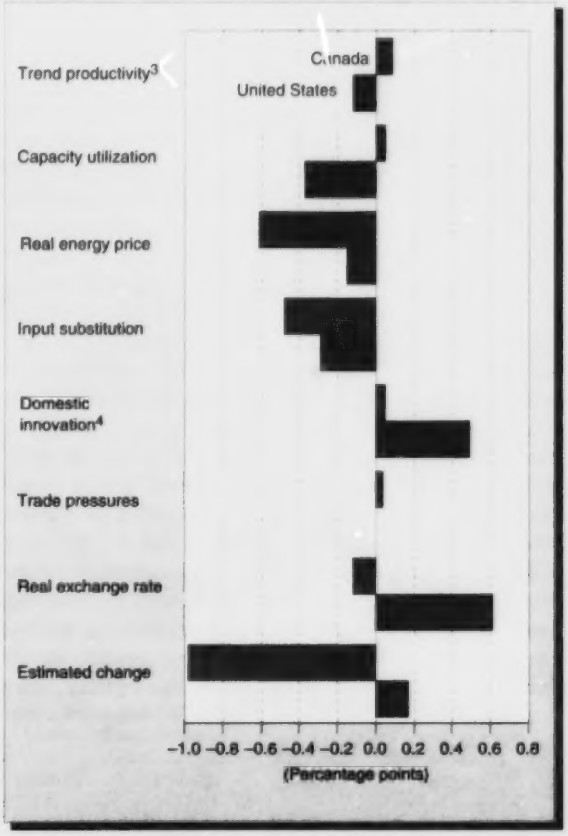
lost ground in that respect to the United States and the other major industrialized countries after 1973? In seeking the answer to that question, we compared productivity growth trends in 12 Canadian manufacturing industries with those of their counterparts in the United States, Japan, and West Germany during the period 1960-85.

The results suggest that the lack of progress in closing the productivity gap between Canada and the United States was largely the result of five factors (Figure 14):

- the energy price shocks had a smaller adverse effect on productivity growth in the United States than in Canada;
- the marked real appreciation of the U.S. dollar in 1980-85 induced a significant rationalization effect in manufacturing and had positive consequences for productivity growth in the United States;
- there was a larger increase in domestic innovation (as proxied by the R&D effort) in U.S. industries than in their Canadian counterparts;
- there was a larger substitution of other inputs for labour in U.S. industries than occurred in Canada; and
- the Canadian industrial structure deteriorated relative to that of the United States, in that in Canada there was a smaller shift of productive resources from manufacturing industries with lower productivity levels to those with higher and/or rising levels.

Figure 14

Change in estimated sources of the labour productivity slowdown in manufacturing[1] between 1966-73[2] and 1974-85, Canada and the United States



1 The figure shows the difference between the estimated contributions of several factors to productivity growth between the two time periods. Labour productivity is defined here as output per hour.
2 1965-73 for the United States.
3 Trend productivity reflects the influence of the "catch-up bonus" (the ability to learn from the experience of others) and of improvements in input quality.
4 As proxied by R&D.
Source Estimates by the Economic Council.

Real Energy Prices

The contribution of energy prices to the productivity slowdown was substantially higher in Canada than in the United States. In sharp contrast, energy prices had a positive influence on Japanese manufacturing productivity growth, as they seem to have fuelled substantial rationalization and induced a faster introduction of energy-saving technologies.

The larger negative impact of energy prices in Canada may be attributable to the slower and weaker adjustment to the first oil-price shock. Despite the large increase in real energy prices that occurred between 1974 and 1979, the amount of energy used (in real terms) per unit of real output in the Canadian manufacturing sector increased slightly, whereas there was a significant drop in the United States (Table 6). This phenomenon was pervasive across many Canadian manufacturing industries. It was not until the 1980s that energy/output ratios in many Canadian industries began to fall. The marked increases in capital/labour ratios in the United States relative to Canadian ratios during the period 1974-79, perhaps stimulated by a larger investment in energy-saving techniques, resulted in a greater reduction in energy use in U.S. manufacturing industries.

The slower and weaker adjustment of Canadian manufacturing industries may have been the result, at least in part, of the federal government's policy of constraining the growth of oil prices. However, we also suspect that this

Table 6

Growth in real energy prices and energy/output ratio in the manufacturing sector, Canada and the United States, 1974-86

	Canada		United States	
	1974-79	1980-86	1974-79	1980-86
	(Per cent)			
Annual growth in:				
Real energy prices	5.9	4.5*	8.4	5.1*
Energy/ output ratio	0.4	–4.4	–2.1	–3.5

*1980-85.
Source Estimates by the Economic Council.

problem was symptomatic of a wider set of rigidities that made the Canadian economy slow to react to shocks.

Real Exchange Rates

In considering the elements that affect the relative cost position of two countries, both the movements of the exchange rate and relative inflation rates must be taken into account. Thus economists often use a measure known as the "real exchange rate" – the market exchange rate between the two currencies, adjusted for differences in inflation rates between the two countries.

The value of the U.S. dollar in real terms, relative to the currencies of all of the trading partners of the United States (of which Canada was only one), appreciated by 2.9 per cent a year, on average, during the period 1974-85, following an average depreciation of 2.1 per cent a year between 1965 and 1973. The average real exchange rate faced by the Canadian manufacturing sector, relative to the U.S. sector, appreciated slightly (1 per cent a year) between the two periods, as a result of a larger appreciation in the second period. (Note that these averages mask considerable year-to-year variation in the real exchange rates of the two currencies.)

The U.S. manufacturing sector, on average, responded to the large real-exchange-rate appreciation of the first half of the 1980s (almost 6.7 per cent per year) with rationalization and revitalization measures, thereby substantially improving its productivity performance (see box). Real-exchange-rate changes are estimated to have added about 0.4 percentage points per year to U.S. manufacturing productivity growth in 1974-85, compared with a negative contribution of 0.2 percentage points per annum in 1965-73. The rationalization effect evidently more than offset the negative impact of lower capacity-utilization rates. Note also that the full beneficial impact of the restructuring on productivity may not have been felt until the late 1980s (which is beyond our measurement period). The Japanese and West German manufacturing industries also responded positively to the real appreciation of their currencies over the period 1960-85 and improved their productivity performance.

In Canada, by contrast, it appears that, on average, the scale effect dominated over the rationalization effect. As a consequence, movements in the real exchange rates had a

Real exchange rates and productivity

Movements in the real exchange rate over time can affect output and productivity. For example, a depreciation of the exchange rate acts as a barrier to imports by raising their prices and, at the same time, by lowering the prices of exports paid by buyers in other countries. Thus it acts as an artificial stimulant to output growth by decreasing import competition and increasing the ability to export. The stimulant is artificial in the sense that the greater ease of selling products does not necessarily result from an underlying improvement in productive efficiency. In fact, by reducing price pressures, depreciation can lower both the incentive and the need to innovate, revitalize, and rationalize.

On the other hand, an appreciation of the real exchange rate can spur productivity growth if revitalization and rationalization occur in response to greater competition from imports and greater difficulty in exporting – what we term the "rationalization effect." However, a real appreciation can also have an adverse effect on productivity through its negative impact on net exports. In turn, a reduction in output growth has adverse consequences for scale economies, the accumulation of physical and human capital, and innovation; thus it will have a negative impact on productivity growth – what we call the "scale (or output) effect."

The net impact of changes in the real exchange rate on productivity growth depends upon the relative magnitude of the rationalization and scale effects. If the rationalization effect is larger than the scale effect, a real appreciation of the exchange rate will have a positive influence on productivity.

slightly larger negative effect on their productivity growth in the second period than in the first. In addition, the large appreciation of the Canadian dollar since 1987 has not yet improved the productivity performance of Canadian manufacturing relative to that of U.S. manufacturing.

Three important characteristics of the manufacturing sector may explain why the scale effect has dominated in Canada: the loss of scale economies for a large number of small establishments; the absence of vigorous domestic competition; and relatively high levels of government protection.

Domestic Innovation and Trend Productivity

The contribution of domestic innovation to changes in productivity growth between the periods 1965-73 and 1974-85 was substantially larger in the United States than in Canada. In the United States, that contribution increased by 0.5 percentage points per year – thanks mainly to the huge increases in R&D effort in the nonelectrical machinery industry (especially computers) and in the chemical industry – compared with a barely perceptible impact in Canada. Similarly, domestic R&D played a much greater role in explaining differences in productivity levels among industries within the United States (electrical machinery and primary metals, for example) and West Germany than in Canada. In Japan, the R&D contribution was stronger still.

These results are not surprising, since Canada relies heavily on imported technology because of its small size, its close proximity to the United States, and its large trade and foreign investment linkages with that country. What is surprising, however, is that the growth in underlying efficiency (as reflected in the measurement of trend productivity growth) did not contribute more to productivity gains in Canada. This suggests that Canadian industry may have been slow in adopting new technological production practices that have been successfully used elsewhere.

Input Substitution

The lower rate of substitution of capital and other intermediate inputs for labour in Canada also contributed to the widening of the manufacturing productivity gap with the United States in the post-1973 period. It added 0.2 percentage points per year to the gap.

Industrial Structure

It has often been suggested that the Canada/U.S. productivity gap in manufacturing is partly the result of Canada's heavy dependence on its resource-based industries – that is, its raw-materials processing industries. By contrast, the United States depends more on machinery and equipment industries. The preceding regression analysis cannot capture the effects of interindustrial shifts in resources in the two countries. Hence, we looked at this question separately.

Our findings show that, on average, the Canadian structure was slightly more productive (by about 1 to 3 per cent) than the U.S. structure until 1970. In the post-1973 period, however, this slight advantage disappeared because the Canadian manufacturing sector did not shift resources out of industries with lower productivity growth as quickly as did its counterparts in the United States, Japan, and West Germany. This deterioration in Canada's industrial structure accounted for at least 7 per cent of the manufacturing productivity gap relative to the United States; at the same time, it contributed at least 8 per cent to a worsening of Canada's position relative to Japan and West Germany.

Conclusions

Our analysis of Canadian productivity performance provides significant evidence that the Canadian economy, especially the manufacturing sector, is slow to adjust to shocks – certainly slower than the U.S. economy. Some of the evidence is direct – for example, rising energy/output ratios in the face of rising real energy prices, slower rates of substitution of capital and other inputs for labour during periods of inflationary wage gains. Some of it is found in the regression results, as reflected in the apparent negative and/or poor response of productivity to energy price shocks and real exchange-rate appreciation. It is also reflected in the evidence that Canada's industry is shifting less effectively than that of other countries towards sectors with higher levels of productivity or with faster growth rates.

Canada's weaker manufacturing productivity performance in the post-1973 period, in combination with the above-mentioned evidence, suggests that the Canadian economy may be less dynamic and less flexible than those of the United States, Japan, and Germany. This conclusion is supported by *The World Competitiveness Report* (published in 1991 by the International Management Development Institute and the World Economic Forum), which seeks to assess the competitiveness of countries by surveying the opinions of senior executives. According to that report, Canada's economic flexibility – the effectiveness of the economy in shifting resources from declining to new industries – ranks well below that of the other three countries. Similar views are found in *Canada at the Crossroads*, prepared by Michael E. Porter for the Business Council on National Issues and the Canadian government.

Unless adjustment to economic shocks occurs more quickly and more firmly in the future, the prospects for a substantial increase in productivity growth are likely to remain poor. However, positive influences, such as the fall in real energy prices, the slowdown in the growth of the working-age population (which encourages greater use of other inputs), and the structural reforms associated with the Canada-U.S. Free-Trade Agreement and with the implementation of the goods and services tax do create the potential for improvements in productivity and real incomes.

Cost Performance in Manufacturing

The productivity performance of a nation plays the dominant role in determining its longer-term competitive position, and thus its ability to raise real wages and to sustain living standards relative to other countries (see Figure 6). But in the short to medium term, changes in exchange rates and in the prices of inputs (labour, capital, energy, and materials) also play an important part in determining a country's cost position and trade performance. In that shorter time horizon, a change in a country's relative cost position affects the volume of its exports and imports, with consequences for output, employment, and capacity utilization in the trading sectors.

In analysing cost performance, we look at the following elements:

- the trends in Canada's manufacturing sector and how they compare with those in other large industrialized countries;
- the roles played by the exchange rate, productivity, and wage costs – the three components of unit labour costs;
- the differences in cost performance between Canada and the United States; and
- the causes of changes in Canadian nominal hourly compensation relative to U.S. levels and in the value of the Canadian dollar.

Cost Trends

The large swings in market exchange rates during the 1980s greatly influenced the trends in unit labour costs (relative cost position) in the major industrialized countries (Figure 15). The good news is that Canada's position vis-à-vis West Germany, Japan, Taiwan, and South Korea improved during the decade, thanks to the appreciation of their currencies.

However, most of Canada's manufactured trade is with the United States, and the bad news is that average Canadian manufacturing costs exceeded U.S. costs by 41 per cent in 1990 – up from only 2 per cent in 1980 (Table 7). At no other time in the postwar period has the Canada/U.S. gap been so wide as in the past few years. As Table 8 attests, slower productivity growth and faster increases in nominal hourly compensation together accounted for virtually all of the widening of the gap between 1980 and 1990. The market exchange rate in 1990 was about the same as in 1980 and thus was not a contributing factor when the ends of the two decades are compared.

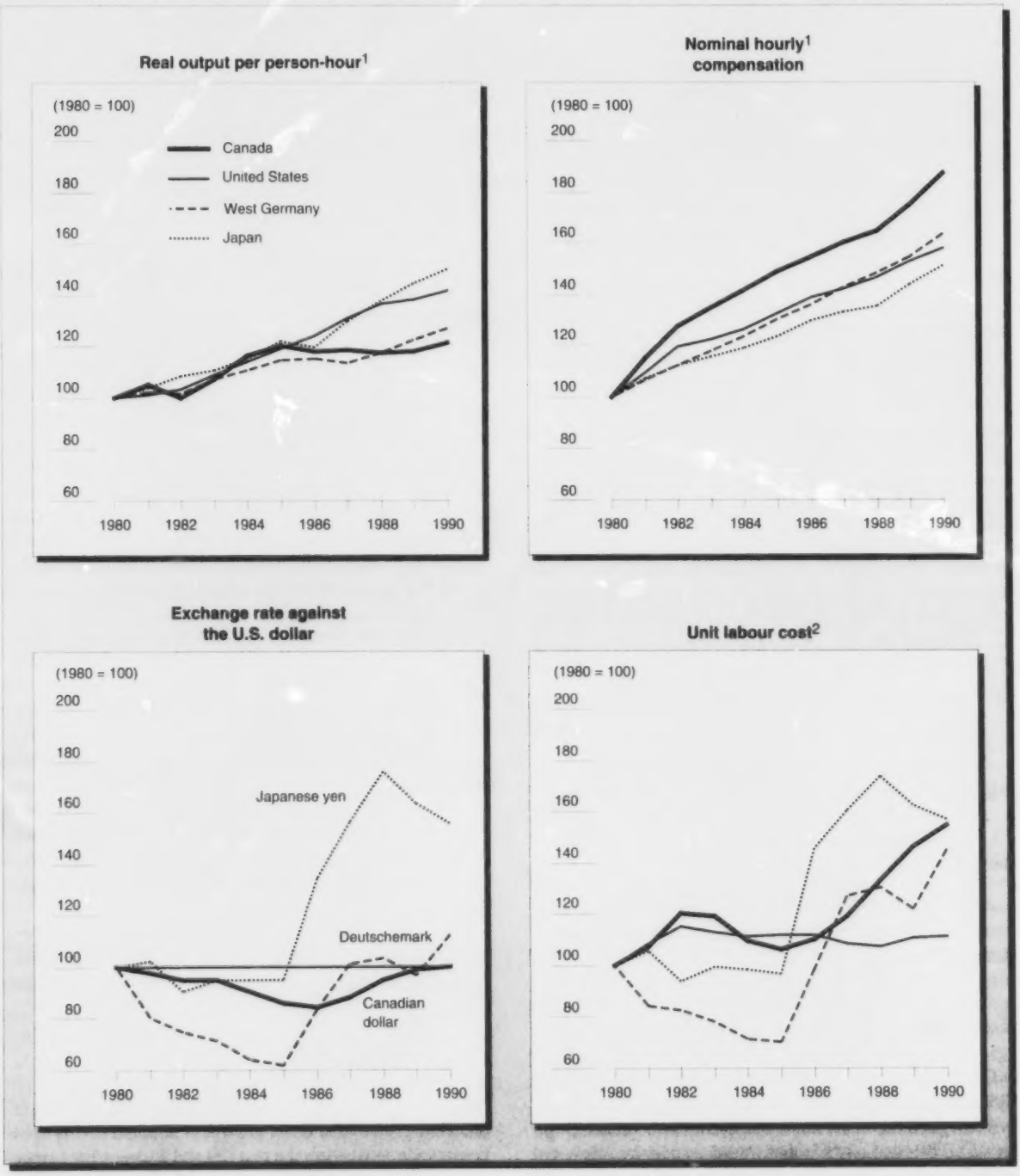
However, the value of the Canadian dollar at the beginning of the 1990s, unlike in 1980, was not in line with the purchasing power of the two currencies. The dollar was overvalued for two reasons: the inability of Canada's traded-goods sector to achieve productivity growth rates equal to those of its U.S. counterpart in the 1980s, and the higher inflation rates experienced in Canada during that period.

Although the market value of the Canadian dollar was the same in 1990 as in 1980, it declined substantially between 1980 and 1986. That depreciation offset the adverse impact that slower productivity growth and larger increases in nominal hourly compensation had on the relative cost position of the Canadian manufacturing sector.

In retrospect, it appears that the declining value of the dollar between 1980 and 1986 served as a form of protection for Canada's traded-goods sector and masked the fact that the growth in Canadian wage costs was getting out of line with that of U.S. wage costs. Canadian industry also appears to have done little to improve its long-term productivity performance during that period. While there are some who now argue that Canada's current "high" exchange rate is severely damaging the ability of its trading sector to retain its market share, the experience of the 1980s makes it clear that a "low" Canadian dollar can also entail costs.

But it is equally clear that the large appreciation of the Canadian dollar since 1986 has compounded the cost problems of many manufacturers in this country. Between 1986 and 1990, the rise in Canadian unit labour costs (in U.S. dollars) was 41 per cent faster than that of U.S. costs (see Table 8) and the situation has continued to worsen since then. Exchange-rate appreciation accounted for about 50 per cent of this deterioration in relative costs, with slower productivity growth and faster growth in nominal hourly compensation contributing the rest (29 and 21 per cent, respectively). At the exchange-rate level of about 86-88 cents U.S. (January 1992), Canadian manufacturing industries, in general, are finding it exceedingly difficult to meet the prices

Figure 15
Indicators of competitiveness in manufacturing, Canada, United States, West Germany, and Japan, 1980-90



1 Based on data expressed in national currencies.
2 Based on data expressed in U.S. dollars.
SOURCE Estimates by the Economic Council, based on data from Statistics Canada and from the U.S. Bureau of Labor Statistics.

Table 7

Unit labour costs in manufacturing, by industry, United States and Canada, 1980, 1986, and 1990

	1980	1986	1990
	(U.S. = 100)		
Resource-based manufacturing			
Nonmetallic minerals	78	83	119
Primary metal products	104	88	123
Food, beverages, and tobacco	110	114	159
Paper and allied products	101	120	167
Lumber and wood products	149	111	169
Nonresource-based manufacturing			
Textiles	92	91	114
Transportation equipment	90	81	118
Electrical machinery[1]	119	88	120
Clothing	104	94	122
Furniture and fixtures	100	93	137
Chemicals and chemical products	96	92	139
Printing and publishing	109	108	141
Leather and leather products	133	118	161
Fabricated metals	100	100	164
Rubber and plastics	110	112	169
Miscellaneous	116	111	175
Nonelectrical machinery[1]	59	96	185
All manufacturing	102	100	141

1 In the U.S. data, computers are included in nonelectrical machinery, while in the Canadian data they are included in electrical machinery.
Source Estimates by the Economic Council, based on data from the U.S. Bureau of Labor Statistics.

of their U.S. competitors; as a consequence, they face significant adjustment pressures. Even the stronger industries – transportation equipment, wood products, and nonmetallic minerals, for example – appear to be having difficulty with their cost structure.

Hourly Compensation Growth

During the 1980s, total nominal hourly compensation (including payroll taxes) in Canadian manufacturing increased at an average rate of 6.5 per cent per year, compared with 4.7 per cent in the United States. Yet Canadian productivity growth during this period was slower than in the United States. In examining this issue, we seek the answers to two interrelated questions: 1) Was the growth in manufacturing nominal wages a cause of, or a response to, consumer price inflation in Canada? 2) What impact did wage growth have on cost performance in Canadian manufacturing?

With respect to the first question, our analysis suggests that the increases in labour compensation in manufacturing were mainly a response to, rather than a cause of, inflation because labour productivity in the manufacturing sector was faster than growth in the real consumer wage and was not greater than the growth in the real producer wage. Thus while it is true that nominal wages grew faster in manufacturing than in some other sectors, that increase was covered by higher rates of labour productivity growth in that sector.

As for the second question, although manufacturing wages did not lead inflation in the 1980s, it is impossible

Table 8

Factors contributing to the difference between Canadian and U.S. manufacturing unit labour costs, 1980-90

	1980-86	1986-90	1980-90
		(Per cent)	
Difference in:			
Productivity growth[1] (1)	–6.2	–11.0	–20.1
Nominal hourly compensation growth[1] (2)	15.5	7.9	29.7
Change in exchange rate[2] (3)	–15.9	19.1	0.2
Difference in unit labour cost growth[3]			
Estimated (2) + (3) – (1)	5.8	38.0	50.0
Actual	–1.7	40.8	43.2

1 A negative (positive) sign indicates slower (faster) Canadian productivity growth.
2 A negative (positive) sign indicates a depreciation (appreciation) of the Canadian dollar.
3 The estimated difference does not exactly match the actual difference because of interaction terms.
Source Estimates by the Economic Council, based on data from the U.S. Bureau of Labor Statistics.

to deny that higher nominal wage settlements in Canada than in the United States were associated with a weakened cost structure (see Figure 15, top right hand chart). The faster growth in nominal hourly compensation in Canadian manufacturing in the 1980s can be broken down into three components. Almost two thirds of the faster growth observed in Canada during the 1980s can be attributed to much higher consumer price inflation in Canada than the United States (Table 9). The other significant factor, accounting for about 30 per cent of the difference, was a combination of modest growth in real consumer wages in Canada and a significant fall in real consumer wages in the United States. Faster growth in payroll taxes in Canada contributed to the rest of the difference.[5]

Thus the growth in hourly compensation in manufacturing, while it was not the dominant factor in consumer price inflation, did contribute to the deterioration in Canada's unit costs relative to the United States. In the U.S. manufacturing sector, real wages dropped even while productivity growth was rising. In Canada, real wages rose even though productivity improvements in this country were more modest than in the United States. It is also worth noting that the reduction in real wages in the United States was much stronger in the latter part of the 1980s and accounted for almost all of the widening of the gap between Canadian and U.S. nominal wages between 1986 and 1990. The inevitable result was to erode Canadian markets and eliminate Canadian jobs.

If Canadian manufacturing had displayed much stronger productivity growth than its U.S. counterpart, it might have been able to retain its real-wage increases in the face of declining real wages in the United States without losing markets and jobs. It might also have achieved the same result by shifting production to lines that sell mainly on the basis of uniqueness, quality, or service rather than price. But as we saw above, not only did productivity growth lag behind that of the United States, but Canada's industrial structure has been slow to change in recent decades. In short, the Canadian manufacturing sector did not make the adjustments needed during the 1980s to offset the cost problems created by the disparity in wage trends between the United States and Canada.

As for the future, the federal government's policy is to move towards price stability, as reflected in the adoption of inflation targets in 1991. Although such a stance entails costs, significant progress is being made in reducing consumer price inflation. If this progress is sustained, then one of the principal sources of manufacturing cost increases in the 1980s – consumer price increases that become imbedded in manufacturing wages – may be substantially reduced in the 1990s.

The Value of the Exchange Rate

When exchange rates were allowed to float in the early 1970s, it was widely believed among economists that this

Table 9

Factors in the growth of nominal hourly compensation in manufacturing, Canada and the United States, 1980-90

	Growth of nominal hourly compensation	Contribution of:		
		Consumer price inflation	Real wage growth	Payroll taxes
		(Per cent)		
Canada				
1980-90	87.2	77.8	6.4	3.0
1986-90	21.3	19.5	1.2	0.6
United States				
1980-90	57.5	58.6	–1.8	0.7
1986-90	13.4	19.3	–6.0	0.1
Difference				
1980-90	29.7	19.2	8.2	2.3
1986-90	7.9	0.2	7.2	0.5

Source Estimates by the Economic Council, based on data from the U.S. Bureau of Labor Statistics and Statistics Canada.

regime would accommodate differences in national macroeconomic policies with the least disruption to trade and employment, and would correct trade imbalances among countries. The reality, however, did not confirm those hopes. The explosive growth of international capital flows over the past two decades, coupled with increased speculation in exchange markets, has produced wide swings in market exchange rates, upsetting the earlier consensus view about the benefits of flexible rates. Rather than correct cost problems arising from differences in national productivity growth and inflation rates, the swings in exchange rates have been the major cause of changes in the short- to medium-term cost position of all the G-7 countries, especially in manufacturing. In turn, these fluctuations in unit labour costs have had disruptive effects on firms and workers in industries subject to international competition.

Could the cost problem of the Canadian manufacturing sector be corrected simply by lowering the value of the Canadian dollar? To answer this question, we must first know what, in some sense, is the "appropriate" level of the exchange rate. If the Canadian dollar is, in fact, overvalued, we need to know the degree and the sources of that overvaluation.

To create a benchmark valuation for a currency, economists have devised the concept of the "equilibrium" (long-run) exchange rate, based on economic fundamentals – the productivity performance in the traded-goods sector, the terms of trade, the rate of inflation, and so on. Over the years, there has been much debate among economists about the appropriate concept and estimation method of the equilibrium exchange rate, but no consensus has been achieved. As a result, it is impossible to estimate accurately the extent of any over- or undervaluation. In order to provide a range of values for the equilibrium value of the exchange rate of the Canadian dollar, the Council developed two different sets of estimates, based on the notion that exchange rates should reflect the relative strength of the "real" economy over the longer run.[6]

The first estimate takes into account Canadian trends in productivity and the terms of trade, relative to U.S. trends. Other things being equal, lower productivity growth in the Canadian traded-goods sector (mainly the manufacturing and primary industries) weakens this country's trade performance and reduces foreign direct investment, thus dampening the demand for the Canadian dollar, lowering its equilibrium value, and inducing a depreciation. Similarly, a loss in Canada's terms of trade – because of a fall in commodity prices in the world market, for example – will weaken the value of the Canadian dollar. Based on this method of estimation, in 1989 the Canadian dollar was overvalued by between 6 and 9 per cent (see Harris).

In the second set of calculations, we estimated the value of the Canadian dollar that would have restored the balance on the current account in 1989 and held all prices and investment income flows plus net transfers to foreigners at their 1989 levels. In other words, only the exchange rate and real incomes at home and abroad were allowed to change. To do this, we used the available estimates of the relationships between trade flows and prices and income, along with observed capital flows, to find a value of the exchange rate that would balance the current account. Since these estimates are sensitive to assumptions about economic growth in Canada and abroad, especially in the United States, we examined several scenarios. According to these estimates, in 1989 the Canadian dollar was overvalued between 8 to 20 per cent, with an average value of about 14 per cent.

Thus the two sets of estimates imply that the overvaluation of the Canadian dollar in 1989 ranged between 6 and 20 per cent, depending on the criterion selected, with the average being in the range between 10 and 15 per cent. In other words, based on the assumption that the exchange rate is the appropriate mechanism for adjustment, the dollar's equilibrium value that year would have been between 75 and 80 cents U.S. Under that same assumption, the Canadian dollar today remains significantly overvalued.[7]

The above estimate reflects the notion that the exchange rate should serve as the adjustment mechanism when a country's economic fundamentals are out of line with those of its main trading partners.[8] But there is also a contrary view arguing that an overvalued exchange rate can act as a spur in improving a country's economic fundamentals. In this view, the "high" dollar will, on balance, lead to improved productivity performance in Canada. And a reduction in market exchange rates would blunt that spur. We shall return to this alternative viewpoint later on.

Explaining the Exchange-Rate Overvaluation

While we continue to believe that exchange rates will reflect the fundamentals of the "real" economy over the longer run, there is no consensus among economists about what dictates the behaviour of exchange rates over the short to medium term. Nonetheless, it appears to us that the value of the Canadian dollar is being determined increasingly on the basis of asset prices rather than of trade flows and relative costs. The increase in foreign capital inflows (both portfolio and direct investment) into Canada in recent years and the associated increase in the demand for Canadian dollars have been keeping the dollar value high, despite the relatively weak performance of productivity and the cost problem. The increase in capital inflows appears to be the result

of such factors as large differentials (current and expected) in nominal and real interest rates between Canada and the other G-7 countries in recent years, and a shift in investor interest towards the Canadian dollar, coupled with speculation in the foreign-exchange market.

In particular, the inflow of foreign capital appears to reflect a broad disequilibrium in public finances. The accumulation of fiscal deficits dating back almost 20 years has led to capital inflows to finance domestic consumption that have exerted upward pressure on the Canadian dollar.

In hindsight, one can now see, for example, that fiscal stimulus promoted a level of activity in the period 1988-90 that could not be sustained without creating inflationary pressures. In the absence of other tools to control inflation, tighter monetary policy was the natural response to these pressures. Of course, the tighter monetary policy pushed interest rates upward and helped to sustain the capital inflows that generated further upward pressure on the dollar in 1990 and 1991.

Consequences of the Exchange-Rate Overvaluation

Whatever the causes of the exchange-rate overvaluation, at least some of its short- to medium-term consequences are evident in its adverse effects on Canada's relative-cost position and hence on net exports, output, and employment. In addition, there is concern that a prolonged period of overvaluation will cause serious adjustment difficulties for industries exposed to international competition and eliminate jobs in the trade-sensitive sectors. Our analysis in the section on trade suggested that the recent (1986-90) deterioration in the cost position of Canadian manufacturing relative to its U.S. counterpart could lower Canadian exports by about 31 per cent and raise imports by 4 per cent by 1994, compared with a situation in which the cost structure had not changed.

The Council's review of the evidence on the impact of past exchange-rate over- or undervaluations on trade flows, industrial output, and employment in other industrialized countries suggests that there are arguments for and against this pessimistic view. We examine both sides of this issue below.

On the more positive side, we observe, first, that the evidence from some other countries shows that an overvalued currency can help to increase productivity growth. In the United States, for example, the negative trade effects of the dramatic appreciation in the U.S. dollar during the early 1980s were corrected by the cost improvements brought on by the rationalization and subsequent depreciation that took place during the period 1985-88. Between 1985 and 1989, the volume of U.S. merchandise exports increased at an average annual rate of 12 per cent. In addition, the U.S. share of world merchandise exports in nominal terms rose from about 11.5 per cent in 1980 and 1985 to 12.4 per cent in 1989. A similar phenomenon occurred in Japan and West Germany after they had experienced exchange-rate overvaluations.

What happened in the United States, Japan, and West Germany in the past could occur in Canada in the 1990s. As in the United States, the longer-term damage caused to Canada's trade performance and comparative advantage by the current exchange-rate overvaluation could be small.

Second, a strong dollar would reduce inflationary pressures. Lower inflation, in turn, could improve productivity performance through its positive impact on capital formation, R&D and innovation, and resource allocation. The case for this view is strengthened by the fact that the benefits of the "low" value of the Canadian dollar in the early 1980s were dissipated quickly.

There is a third argument against the pessimistic view. It is linked to the important changes in public policy that have been introduced since the mid-1980s, such as tax reform, trade liberalization, and elements of deregulation. As a result of these changes, it is likely that markets are working more effectively now than they were in earlier periods. And with these improvements, it may turn out that the effects of the current high value of the Canadian currency will be somewhat different now than in earlier time periods. In other words, even though – according to our analysis, as set out in the preceding section – the "scale" effect of an overvalued Canadian currency outweighed the "rationalization" effect during earlier periods, it does not necessarily follow that the same is happening today.

Finally, it is arguable that because a strong dollar keeps the prices of imports down, domestic wage settlements in Canada are more moderate than they would otherwise be. To the extent that this is true, not all of the upward pressure on the exchange rate affects the Canadian cost structure adversely.

At the same time, it is much too early to dismiss the possibility of longer-term adverse consequences of a higher Canadian dollar, because the Canadian situation differs from that of other countries in several respects that could turn out to be important.

First, the U.S. market is much larger than the Canadian market. Other things being equal, there is an incentive for investors to move incremental activity to the larger market

or, when markets are growing slowly, to rely on existing facilities in the United States while closing Canadian facilities. To offset that incentive, cost performance in this country must be superior to that in the United States.

Second, with the Canada-U.S. Free-Trade Agreement, a corporation can move its production to the country with the better cost trends and cost position because access to the market of the country with the weaker cost position is now – or is in the process of becoming – tariff-free. This makes it all the more necessary to strengthen Canada's cost performance.

Third, as mentioned earlier, there is evidence to suggest that, in the past, the Canadian manufacturing sector has not responded well, on average, to exchange-rate overvaluation, in contrast with the experience in other countries. Thus if the dollar is overvalued in terms of Canada's underlying productivity and cost trends, this could exacerbate the poor relative productivity performance of the Canadian manufacturing sector because of the lower capacity utilization and loss of scale economies associated with the short- to medium-term loss in exports and output.

This suggests that there are significant risks associated with a sustained period of exchange-rate overvaluation. It could induce an exodus of entrepreneurs, highly skilled labour, and investment to other countries, especially the United States, because of reduced economic opportunities in Canada. And a subsequent recovery in Canada's cost position might not necessarily trigger an offsetting reverse migration – at least not very quickly. The net loss of human and physical capital could cause a long-lasting contraction of skill- and capital-intensive industries in Canada, adversely influencing the potential for growth in productivity and real incomes.

In short, plausible arguments can be made both for and against the current "high" value of the Canadian dollar. By the time all the facts have been collected and a definitive assessment can be made about the longer-term effects of overvaluation on industrial performance, it could be too late to correct any mistaken judgments.

Conclusion

The deterioration in Canada's manufacturing cost position relative to the U.S. between 1980 and the beginning of the 1990s was the result of two factors: 1) weaker productivity growth; and 2) faster growth in labour compensation, which was in turn mainly a reflection of higher rates of consumer price inflation in Canada. The appreciation of the Canadian dollar since 1986 has compounded the cost problems. As seen earlier on in this Statement, a significant proportion of output and employment losses in the Canadian manufacturing sector between 1989 and 1991 is attributable to the large deterioration in its cost position.

On the latter issue, our research suggests that, in relation to long-run fundamentals, the Canadian dollar has been significantly overvalued in recent years. An overvalued dollar can have positive effects by spurring improvements in productivity and reducing inflationary pressures. Without this spur, such improvements might occur more slowly. But when an overvaluation is large, it may simply discourage some firms from even attempting to improve the productivity of their Canadian operations. Instead, these firms may prefer to relocate outside Canada.

Although we believe it is highly desirable that the external value of the Canadian dollar move closer to its underlying economic fundamentals, there is no quick and costless way of achieving that goal. Given that short-term movements in the exchange rate appear to be heavily influenced by capital flows, which in turn respond to interest-rate differentials, any reduction in the Canadian exchange rate is likely to require a reduced dependence on capital imports. That is not likely to occur until Canadian governments have improved their fiscal positions significantly. In the absence of such improvements, the current spread between Canadian and U.S. interest rates could persist, impeding downward movements in the Canadian dollar.

While a lower exchange rate for the Canadian dollar would improve the short-run cost position of Canadian manufacturing, we believe that productivity growth and compensation settlements – not the exchange rate – are the key issues over the medium to long term. Improvements in these two areas are fundamental to a strengthening of Canada's position internationally. A failure of management and labour to act on these realities will continue to cost Canadians dearly in terms of both jobs and living standards.

This does not mean that labour compensation must be lowered. But it does mean that wherever Canadian industry is at a cost disadvantage and wishes to retain markets, productivity gains must be either large enough to offset any wage differentials that exist and any productivity improvements achieved by its competitors, or there must be a shift towards products that are not sold mainly on the basis of price on world markets. Unfortunately, as we saw earlier, Canada's areas of specialization – the areas in which it has a comparative advantage – are changing more slowly than in many other industrialized countries. Other issues surrounding innovation are the subject of the next section.

Finally, we point out that the high rates of consumer price inflation that became imbedded in Canada's manufacturing wage structure in the 1980s were an important cause in the weakening of its cost position. If the federal government's current efforts to move towards price stability are successful, then one of the major ingredients that has hurt Canada's cost performance during the last decade would be much reduced.

Innovation and Competitiveness

Technical progress, whether originating from foreign or domestic technologies or from qualitative improvements in factor inputs, has been a very important source of economic growth in Canada. While it is strong, the relationship between technological innovation and economic performance is also a complex one. To understand this linkage, it is important to consider the nature of technology and its interaction with the economy. These interrelationships can be summarized as follows:

- Technology is not a machine or an artifact; technology is, first and foremost, a body of knowledge (techniques, methods, and designs) derived from many sources. Technological progress requires a complex, cumulative, and continuous learning process. It is also increasingly recognized now that technological innovation is an "endogenous" process: it is mainly undertaken by business firms as part of their normal response to changes in economic incentives and growing international competition.

- The technological *innovation process* encompasses a wide range of activities – from the introduction of a new product or new method of production to the opening of a new market, the reorganization of a firm, or the discovery of a new source of raw materials. Our focus here is limited to those aspects which concern new or improved products and production processes.

- From the perspective of national economic and productivity growth, the diffusion and adoption of innovations across many firms or industries is of great importance. They can enhance overall productivity only if their effective use is widespread within and across industrial sectors.

- The technological capacity of any one firm is strongly influenced not only by its own internal "culture" and knowledge base but also by the external environment surrounding it. The external factors that are relevant to its performance include the quality and type of the nation's education and training systems and physical and research infrastructure, the competence and knowledge base of other firms, the country's network of technological assistance, and the level of government encouragement and promotion of technology through macroeconomic, trade, and competition policies, capital-market regulation, and so on.

- The speed of technical change is accelerating, in three ways. First, the time span between the discovery of a new scientific idea and its use to create and develop new products and new processes has shortened. Second, the product life cycle has considerably shortened – that is, the time span between the introduction of a new product or process into the economy and its replacement by a superior substitute has decreased. And third, international competition in technology-based trade is becoming increasingly fierce.

- Technical innovations have a profound influence on a firm's organization. They redefine workplace functions and tasks, shift patterns of staff responsibility, and change the integration of various functions in the organization. Furthermore, they generally require changes in the skill mix of workers in the production processes and in the role of management at the firm level. Once these organizational changes occur, they tend, in turn, to influence the innovation process in the firm and alter the firm's strategies, policies, procedures, and culture.

- "Research and development" generally includes research (both basic and applied), specification and design, and the development of prototypes and pilot plants. Research proper, as opposed to product and process development and other innovation activities, is but a small part of the whole innovative process. For example, applied research costs represent only about 6 per cent of total innovation costs in Canadian manufacturing (Table 10).

To shed light on Canada's technical innovation performance and on the linkages between technical innovation and productivity performance, we compare Canadian indicators of technical innovation performance with those of its major trading partners, and then discuss some evidence on the role of technical innovations in increasing productivity in Canada.

How Does Canadian Technical Innovation Compare?

There is no single set of reliable indicators of a country's relative capacity to innovate. In part, that is because the process of technical innovation is so complicated that, even if ideal data were available, it might be difficult to select one or two key factors that could adequately capture the ranking of different countries. But the data available

Table 10

Distribution of innovation costs in manufacturing industries,[1] by innovation phase, Canada, 1991

	Product innovations	Process innovations	All innovations
		(Per cent)	
Innovation phases:			
Applied research	17	3	6
Preparation of product specification and design	9	3	4
Prototype or pilot plant	36	35	35
Tooling and manufacturing equipment and facilities	19	57	49
Manufacturing start-up	11	2	4
Marketing start-up	8	1	2
Total	100	100	100

1 The sample sizes are: all innovations, 105; products, 81; processes, 24.

Source Vinod Kumar and Uma Kumar, "Technological innovation in Canadian manufacturing industry: an investigation of the speed and cost of innovation," School of Business, Carleton University, Ottawa, August 1991.

are far from ideal and are very uneven across countries. All inter-country comparisons necessarily have limitations as a result, but comparisons are frequently attempted nonetheless. They involve such diverse criteria as R&D expenditures, the number of patents granted, the proportion of the labour force that is made up of scientists and engineers, the adoption rate of new technologies, the level of on-the-job training, and so on.

By virtually any of these criteria, Canada ranks poorly among the industrialized countries. This is illustrated here by examining three criteria: R&D investment, adoption rates for advanced manufacturing technologies, and human-resource development and management practices.

Investment in Research and Development

The level of innovative activity in a country is most frequently inferred from the national commitment to R&D, especially on the part of the business sector. The most commonly used measure of national R&D commitment is the ratio of gross domestic expenditures on research and development to gross domestic product (the R&D/GDP ratio). Canada has the third-lowest ratio (after Australia and Italy) among a group of 12 leading industrialized countries (Table 11); its ratio is substantially lower than those of smaller countries such as Sweden, Switzerland, and the Netherlands – three countries with industrial sectors that are noted for their world-class technological leadership. Whereas most of the industrial countries appearing in the table saw their R&D/GDP ratio rise significantly between 1981 and 1989, Canada's ratio grew only marginally during the period.

Table 11

Gross expenditure on research and development, as a proportion of gross domestic product, Canada and selected other OECD countries, 1981 and 1989

	1981	1989
	(Per cent)	
West Germany	2.42	2.88
Switzerland	2.29	2.86
Japan	2.14	2.85
United States	2.45	2.82
Sweden	2.30	2.76
France	1.97	2.32
Netherlands	1.88	2.26*
United Kingdom	2.41	2.20*
Austria	1.17	1.40
Canada	1.21	1.33
Italy	0.87	1.29
Australia	1.01	1.24*
Average	1.84	2.18

*1988.

Source Data from the OECD, 1991.

The overall contribution of Canadian industry to the national R&D effort is still relatively low, but it has increased

significantly since 1978 (Figure 16). In measuring R&D propensity, we find that the ratio of total manufacturing expenditure on R&D to value-added in Canada rose from 2.2 to 3.2 per cent between 1970 and 1986. About one fifth of this increase was attributable to changes in the industrial structure; and the rest, to a greater willingness by individual manufacturing companies to undertake more research. In 1987, in only two industries – electronics and computers – were Canadian research propensities significantly higher than the average among the large industrialized countries (Figure 17).

One might expect Canada's resource-based manufacturing sector to be relatively research-intensive, given its importance to the Canadian economy. That does not appear to be the case, however. For example, the R&D propensity of the resource-based manufacturing industries is only about 40 per cent of the average for the overall manufacturing sector. This situation contrasts with that in smaller countries such as Sweden, which invest heavily in research in their key resource sectors (food-processing and pulp and paper). In Canada, there is no such commitment.

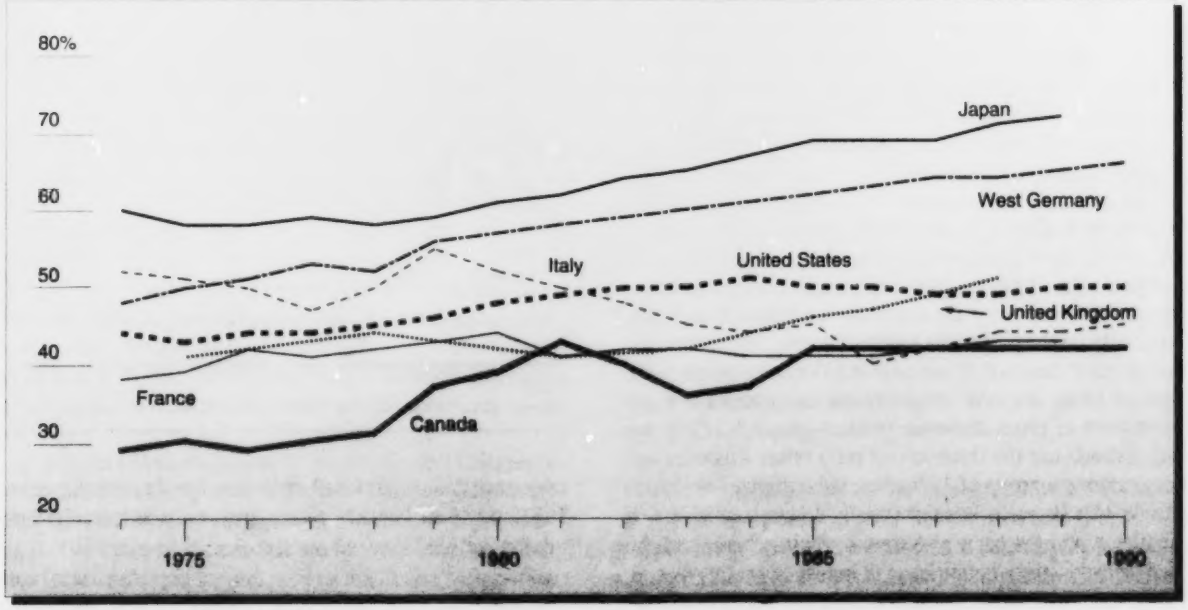
Canada's weak performance is compounded by the fact that corporate R&D behaviour is no longer being accurately captured by domestic data. Between 1980 and 1987, there was a large increase in Canadian foreign direct investment (FDI) into the United States, much of it in manufacturing. This was accompanied by a huge increase (US$1.6 billion) in R&D spending by the U.S. affiliates of Canadian corporations and by a five-fold jump in their propensity to do R&D (Figure 18). This increase was all the more remarkable in that the increase in the domestic R&D propensity of the Canadian manufacturing sector was only 40 per cent.

A key question is whether the increase in R&D activity by Canadian-controlled firms in the United States is complementary to, or a replacement for, the innovation activities of those same firms in Canada. Is this R&D activity aimed at taking advantage of opportunities that are simply unavailable or impractical in this country? If the answer is yes – if the R&D activity conducted in the United States is wholly or largely incremental to R&D carried out in Canada – then there is little reason for concern.

If, on the other hand, the large increase in R&D spending by the U.S. affiliates of Canadian corporations represents a transfer to the United States of activities that might have otherwise taken place in Canada, this raises some obvious implications for present and future Canadian com-

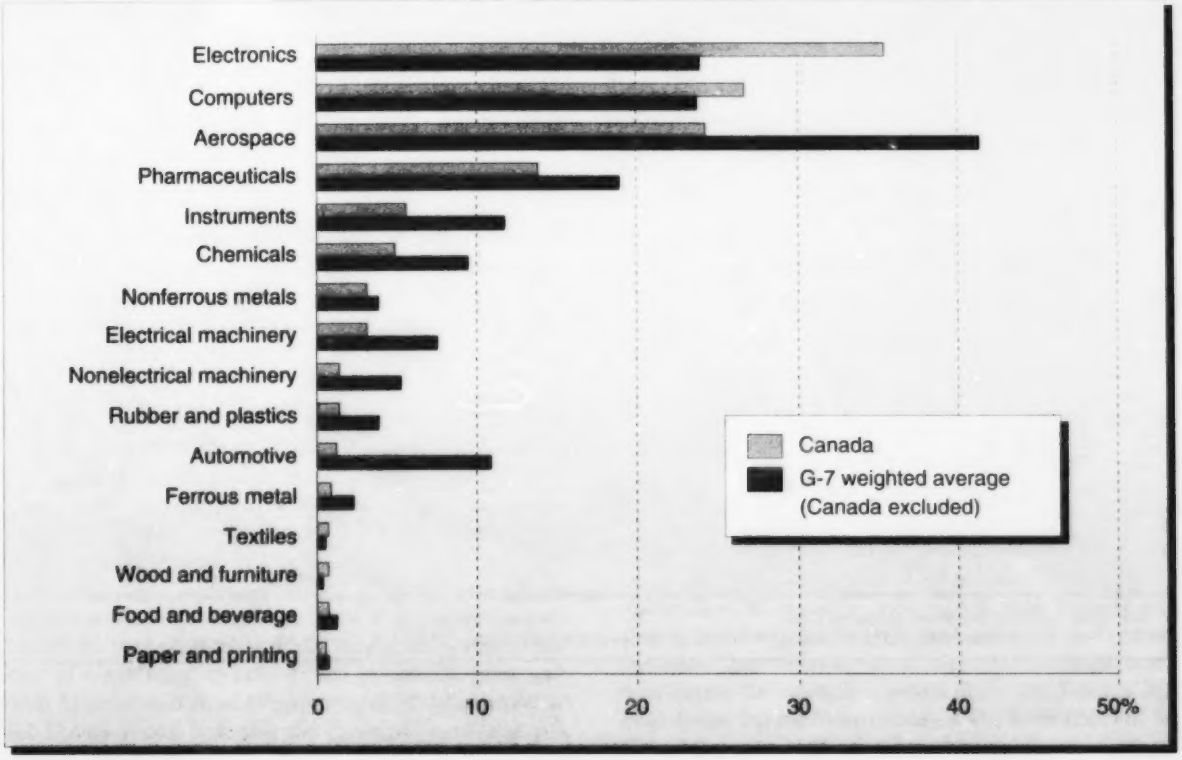
Figure 16

Business-sector share of total gross expenditure on R&D, G-7 countries, 1974-90



SOURCE Based on data from the OECD.

Figure 17
Business expenditure on R&D as a proportion of value-added, Canada and the other G-7 countries, 1987[1]



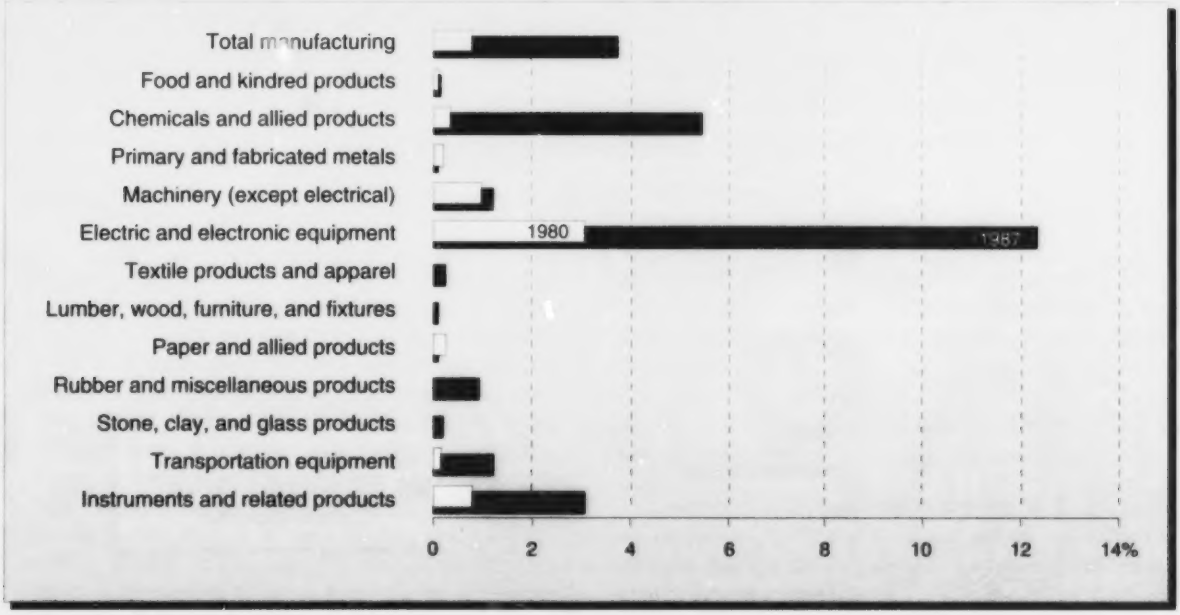
1 Or latest year available.
SOURCE Based on data from the OECD.

petitiveness. The implications are particularly serious if Canadian firms find the United States a more attractive environment to do research and development – for example, if it is easier to recruit highly skilled personnel there or if there are efficiencies in locating R&D activity in communities with high concentrations of high-tech firms and research facilities.

Equally worrisome is the possibility that highly skilled Canadian workers (engineers, scientists, and managers) are being transferred to the United States as part of the growing presence of Canadian firms in that country. Moreover, the movement of innovation activities to the United States may adversely affect the ability of firms remaining in Canada to undertake R&D and thus to innovate themselves. This can occur if the remaining firms in the same industries, for example, are unable to copy or imitate product and process innovations effectively because of geographical barriers.

Some evidence of a shift of innovative activities to the United States may be provided by data on cross-border payments of royalties and licence fees. During the 1980s, Canada was one of the few countries with major investments in the United States that recorded an increase in the net flow of such payments by domestically controlled corporations to their U.S. affiliates. In 1989, for example, there was a net outflow of US$53 million from these companies to their U.S. affiliates, compared with a reverse flow of US$17 million in 1983. While suggestive, these data do not provide enough evidence for us to understand fully the implications of this trend of Canadian-controlled companies to conduct R&D activities through their U.S. affiliates. In sum, while the evidence available does not reveal a clear shift of "home base" activities from Canada to the United States, it does raise a warning flag to economic policymakers in Canada about the urgent need for more research.

Figure 18
R&D propensity[1] of U.S. affiliates of Canadian corporations, selected industries, 1980 and 1987



1 Measured as R&D expenditures divided by sales.
SOURCE Special tabulations prepared for the Economic Council by Bureau of Economic Analysis of the U.S. Department of Commerce.

Acquisition and Diffusion of New Technologies

The Use of Advanced Manufacturing Technologies in Canada — The use of advanced manufacturing technologies (AMTs) is a hallmark of the innovative firm. AMTs range from computer-aided design and manufacturing through robotic assembly plants to automatic measuring devices. They support a new, more effective manufacturing model and thus have come to be regarded as an important strategic determinant of productivity performance, competitiveness, and structural transformation for firms and countries.

The Economic Council has long been concerned with the diffusion of new technology in Canada. In 1983, we argued in *The Bottom Line* that the spread of technology into and within Canada was slower than was the case for other developed nations. In 1985, the Council undertook the first extensive assessment of Canada's position with respect to the use of computer-based technologies. In *Making Technology Work*, the Council showed that Canada lags behind a number of other western industrialized nations in the use of new technologies.

In 1989, Statistics Canada surveyed establishments on their use of 22 separate advanced manufacturing technologies in seven areas. This survey covered establishments of all sizes (as measured both by the size of shipments and by the number of employees) and obtained estimates of AMT use for 15 separate manufacturing groups. Non-users were asked if they planned to introduce the advanced technology, if they felt it was too costly, or if they felt it was inappropriate to their business.

Based on this survey, it was determined that for all the categories of technology, establishment size is the most important determinant of AMT use. It appears that large establishments can more easily cope with the fixed costs, both financial and learning-based, associated with AMT use. On average, the likelihood of AMT use in an establishment with over 500 employees is two to four times greater than in an establishment with fewer than 100 employees, with the size threshold varying according to the type of technology.[9]

AMT use is not even across industries in any country. In Canada, there are two distinct clusters of intensive AMT

users. Manufacturing firms with at least twice the average level of use of computer-aided design machines, numerically controlled machine tools, flexible manufacturing systems, and robots are clustered in the same few industries as they are in other countries – machinery, transportation equipment, electrical and electronic equipment, and fabricated metal products. These firms use AMTs for such functions as shaping, assembly, and movement. But there are also high levels of use of other kinds of advanced equipment in primary processing industries – for example, paper products; primary metals and nonmetallic minerals; and food, beverages, and tobacco. They make extensive use of local-area computer networks and computer-based final-product inspection and quality testing in their factories. These resource-intensive industries apply AMTs primarily for process control and coordination.

AMT Use in Canada and the United States — How does Canada compare with the United States in AMT use? A partial answer is provided in a study prepared for the Council, in which the use of 17 advanced manufacturing technologies in five major industrial groups (metal fabricating, machinery, transportation equipment, electrical and electronic equipment, and instruments and related products) in the two countries is examined. These five groups account for 40 per cent of manufacturing employment and 39 per cent of manufacturing value-added in Canada, compared with 43 per cent both of employees and of value-added in the United States. Note that the Canada/U.S. comparison does not include some resource-based manufacturing industries where Canadian AMT use might be relatively greater.

On average, the incidence of AMT use in the five industry groups is greater in the United States than in Canada by some 5.5 percentage points – a statistically significant difference (Table 12). The gap is particularly high in the transportation-equipment and electrical- and electronic-equipment groups. The gap is also evident across eight technology groups, especially with respect to numerically controlled machines and computers used for factory control.

Two related observations strengthen the overall impression that Canadian industry is adapting AMTs more slowly than other countries. First, in the manufacturing sector the technological frontier has moved from the use of separate AMTs to the integration of different AMTs into complex systems. For all establishment-size groups and all industries, Canadian establishments are significantly less likely than their U.S. counterparts to use such integrated systems (Table 13). This indicates fewer and less extensive AMT systems in Canada than in the United States.

Table 12

Proportion of establishments using AMTs, by major industrial group, Canada and the United States, 1989[1]

	Canada	United States
	(Per cent)	
Transportation equipment	12.0	19.4
Electrical and electronic equipment	15.2	21.5
Instruments and related products	13.1	18.7
Machinery	14.0	18.3
Metal fabricating	9.1	13.2
Average	12.7	18.2

1 The U.S. data are based on a survey conducted in 1988.

Source D. G. McFetridge, *Analysis of Recent Evidence on the Use of Advanced Technologies in Canada*, Economic Council of Canada (forthcoming).

Second, in *Gaining New Ground* (1991), the U.S. Council on Competitiveness finds that the United States itself is relatively weak in design technologies, most kinds of process equipment (including robotics), and total quality management. Thus a broader-based international comparison – with Japan, for example – would show that Canada lags even farther behind those countries which are ahead of the United States in AMT use.

Much of the difference between Canada and the United States can be attributed to the greater average size of U.S. establishments. Canadian AMT use would be 2 percentage points higher if establishments in this country were as large as those in the United States. These scale-adjusted effects would be greater than average for the transportation-equipment and "instruments and related products" industries, and lower than average for metal fabricating. Among technology classes, programmable controllers, computers for factory control, communications equipment, and numerically controlled machines all exhibit larger-than-average scale-adjusted effects.

While adjusting for differences in the scale of establishments reduces the adoption gap by 2 percentage points on average, a gap of 3.5 percentage points remains. This gap is not confined to specific industries or technologies.

Other factors were also examined. In the transportation-equipment industry, it was found that the intra-industry mix favours greater AMT use in the United States than it does in Canada. This is attributable, in part, to the fact that the

Table 13

Use of technologies in manufacturing establishments, by size of employment, Canada and the United States, 1989[1]

	Number of technologies used							
	None		One		Two to four		Five or more	
	Canada	United States	Canada	United States	Canada	United States	Canada	United States
	(Per cent)							
Employment size								
20 to 99	50	33	18	18	24	34	8	14
100 to 499	19	11	15	12	36	37	30	40
500 or more	2	2	2	2	25	13	71	83
All establishments	42	26	17	16	26	34	15	25

1 The U.S. data are based on a survey conducted in 1988.
Source Data from Statistics Canada.

Canadian transportation-equipment industry has relatively more establishments involved in railway rolling stock and shipbuilding, and relatively fewer involved in producing aircraft and motor-vehicle parts, where AMT use is more intensive. A higher proportion of U.S. firms are engaged in defence-related work – which often calls for the use of specific AMTs – and this accounts for some of the remaining gap between Canada and the United States. But even when the influences of size, industry mix, and defence contracts are accounted for, Canada still lags behind the United States in the use of advanced manufacturing technologies.

What other factors play a role here? Anecdotal evidence suggests that Canadian companies pay more for AMT equipment than their U.S. counterparts. If true, this situation would indeed limit AMT use in Canadian firms. Another reason commonly offered is that Canadian firms have relatively more difficulty in finding skilled help, technical advice, and so forth. For example, Statistics Canada's survey on AMT use found that about one half of the establishments had difficulty in finding highly skilled personnel. Another research study, done at the company level, found that "at least 50 per cent of the problems" in implementing CAD (computer-aided design) came from human and work organizational difficulties rather than technological problems.[10]

Human and Organizational Factors

The quality and quantity of skilled people – and the way in which they are organized and managed – are fundamental to successful innovation within the individual firm. This applies not only to those innovation activities which reflect R&D activity in Canada but also to the adoption of new ways of producing goods and services that originate outside Canada. Given the size of the Canadian economy, identifying and successfully making use of new foreign technologies is indeed vital to building a more innovative society and promoting its growth.

Given the rapid pace of technological change and the changing nature of what workers are now called upon to do in the workplace, the profiles of present and future jobs are substantially different from the kinds of jobs that were available 20 or 25 years ago. In *Employment and the Service Economy*, the Council's researchers described in detail the changing demand for different skills. They pointed out that there was a trend towards an overhaul of the employment structure and that this was linked to the need for upgrading skills within all industries, as opposed to a change in the industrial structure of the economy. They concluded that "overall, a number of factors, most prominently technological change, [are] leading to a reorganization of production in both goods and services, and employment is increasingly concentrated in more highly skilled jobs" (p. 110).

Thus, with respect to the demand side of the labour market, three main effects are noteworthy: 1) there is an across-the-board increase in the minimum level of competence required; 2) a greater proportion of the work force needs to be more frequently retrained or upgraded than used to be the case; and 3) there is a shift in the relative importance

of the skill categories required. As technologies change, new skills are required in production systems. For example, new information and computer technologies require that various production functions (such as design, manufacturing, marketing, and inventory control) be integrated. This integration generates a demand for new skills based on the ability to communicate and solve problems across various functions. At the same time, the acceleration of innovative activity in the economy requires the frequent updating of the skills of all workers, including blue-collar workers. The retraining of the work force is essential not only to enhance the firm's capability to promote new products and processes but also to create the organizational flexibility needed to adapt smoothly and effectively to changes in the external environment. Canada's ability to compete effectively is inextricably linked to its ability to meet these needs.

As for the supply side, the availability of human resources has two principal dimensions: the number of people who are willing to work, and what they can do. As in most OECD countries, the growth of the labour force in Canada is expected to slow down over the next few decades because of changes in the age structure of the population. However, the qualitative dimension of the supply of human resources is more important in promoting innovation and, in particular, the diffusion of new technologies across various industrial sectors.

The quality of the labour supply depends on a number of factors, such as the educational attainment of the work force (i.e., literacy and numeracy levels), standards for highly qualified people (e.g., engineers or scientists), and skill development through on-the-job training. These qualitative aspects, which have been widely discussed in recent years, have an important influence on Canada's innovation process. Although the average number of years of schooling of the Canadian population is high (over 12 years), the high secondary-school dropout rate – about 33 per cent – reflects the weakness of the general school system. By contrast, the Japanese dropout rate is only 2 per cent, and it is less than 10 per cent in Germany. The large number of dropouts from the Canadian secondary-school system results in a group of workers who may be functionally illiterate and thus difficult to train. In addition, a recent literacy survey by Statistics Canada indicates that about one third of high-school graduates (about 1.2 million) cannot perform everyday reading requirements. Similarly, 36 per cent of high-school graduates (about 1.5 million) experience varying degrees of difficulty in working with numbers. As a result, several Canadian universities have imposed basic literacy tests and provided remedial courses for first-year students. Business enterprises have also expressed concern about the quality of basic education among new entrants into the labour market.

The dropout and illiteracy problems are no doubt linked in part to the failure of all provinces to develop a strong and credible vocational training system for those who do not perform well in the current secondary-school systems. This failure is also related to the absence of strong links between high schools and the business world – a subject that will be discussed in greater details in a forthcoming statement by the Council.

Any sustained growth in Canadian innovation activity will require increasing numbers of technically qualified graduates. The proportion of scientists, engineers, and technicians in the Canadian labour force is already substantially lower than in the United States, Japan, and Germany. The enrolment in science and technology disciplines at both the university and technical-college levels is also declining (Table 14). Moreover, since all countries are now competing for people with technical skills, Canada may have difficulty repeating its past success in attracting qualified immigrants and could thus experience a shortfall in the future supply of scientific and technically qualified personnel. Skill

Table 14

Full-time undergraduate enrolment in science and technology[1] at Canadian community colleges and universities, Canada, 1984-90

	Number	Proportion of total enrolment
		(Per cent)
1984-85		
Community colleges	75,038	33.2
Universities	99,204	24.4
1985-86		
Community colleges	70,724	31.5
Universities	97,545	23.7
1986-87		
Community colleges	64,479	29.2
Universities	96,088	23.0
1987-88		
Community colleges	59,828	27.4
Universities	93,592	21.9
1988-89		
Community colleges	57,784	26.7
Universities	93,293	21.2
1989-90		
Community colleges	57,290	26.7
Universities	93,085	20.6

1 Excluding enrolment in health-care training.
Source Data from Statistics Canada.

shortages are already emerging in some advanced manufacturing industries, such as aircraft and automotive assembly. In Statistics Canada's 1989 survey of AMT use, about half of the Canadian manufacturing establishments that had adopted advanced manufacturing technologies faced at least "some" difficulty in hiring skilled workers. Finally, training no longer has a long "shelf life" but must be upgraded and revitalized frequently throughout a worker's career. Canada has low levels of on-the-job training, and its industries spend less than half as much on the retraining or upgrading of their workers as U.S. industries do; the figures are even more dismal in comparisons with Japan and Germany.

The role of the manager in nurturing innovators and innovations is crucial in determining how effectively the firm performs. Management decides whether, when, and how to integrate technology into the company's operations. Studies devoted to the impact of management suggest, however, that many Canadian companies have deficiencies in the management of innovation.[11] They often fail to translate the development and adoption of new technology into their production. This is attributable to the way Canadian firms are organized and to the attitude of senior managers towards innovations. The isolation of top managers from conditions on the factory floor and from those among their customers and suppliers who might influence their strategies about new technology is a symptom of this problem. Managers emphasize speedy results and pay little attention to long-term planning. In this regard, the evidence that North American managers have a propensity to shorter-term time horizons than their European and Japanese counterparts is relevant. This approach appears to be linked to underinvestment in human-resource development and in R&D, as well as in slower adoption of new technologies.

Technical Innovation and Productivity Growth

R&D is an important component of the innovation process. It establishes a link between science and concrete technological innovations; it opens up new technological opportunities; and it is the first step in learning to use or to appropriate new technologies. However, as noted above, R&D is by no means the only component of technological innovation; nor is it even an ideal measure of technological capability, since it is an input measure of technological creation. Nevertheless, R&D spending is one of the few components of innovation for which detailed data are available for the OECD countries. It is often used as a proxy for estimates of all innovation activities in the economy.

R&D spending can have direct productivity-enhancing effects in the sector that conducts the research – through cost reduction in the case of process innovations and/or through market expansion in case of product innovations. Moreover, one sector's R&D can also improve productivity in other sectors through spillover effects. Innovations inspire diffusion and further innovations elsewhere; ideas are borrowed, altered, and improved upon. R&D can also make indirect contributions to productivity through its interactions with other factor inputs. As R&D and capital are complementary, increasing R&D spending will eventually induce the business firm to invest in the machinery and equipment that embody new technology. Moreover, conducting R&D may enhance the firm's ability to assimilate, exploit, and diffuse new knowledge. It may develop its "learning" or "absorptive" capacity, thus improving its ability to adapt, and as a consequence, enhancing its productivity. Ultimately, the influence of R&D is reflected in rising real incomes.

We have surveyed recent empirical research on the impact of R&D investment on output growth (as measured by the rate of return) in Canada, the United States, and other industrialized countries. The higher the rate of return on R&D investment, the higher the impact on level of productivity. The main findings are as follows:

- The private rate of return on R&D spending, which ranges between 10 and 40 per cent, exceeds the rate of return on physical capital.

- R&D benefits spill over to other business firms or to other industries. The spillover effects can be substantial. Social rates of return of 50 to 100 per cent in excess of the private rates of return are not unrealistic.

- Certain key sectors of the economy (such as chemicals, nonelectrical machinery, and scientific instruments) have higher-than-average social rates of return. These sectors also have above-average technological opportunities.

- Different kinds of R&D have different impacts. Our survey of research studies (see Mohnen), for example, confirms some commonly accepted views – for example, that basic research has a higher rate of return than applied R&D; that company-funded R&D is more productive than publicly funded R&D; and that R&D focused on new production processes has a higher rate of return than R&D focused on new products.

As stated earlier on, about 13 per cent of labour productivity growth in Canadian manufacturing during the period 1966-73 was attributable to domestic R&D expenditures. In the United States, on the other hand, R&D made a much

larger contribution (about 58 per cent) to productivity growth during the same period. Given the size of the Canadian economy, it is not surprising that domestic innovations account for a much smaller proportion of productivity growth than in the United States. Of two countries at a similar stage of economic development, the smaller one will depend more on imported technology.

Imported technology, which usually makes greater contributions to productivity growth in Canadian industries, is acquired through foreign investment, licences, trade in high-technology products, cooperative research, and information exchange. In fact, over 90 per cent of the technologies used by Canadian industries come from abroad. In the past, Canada has depended heavily on imported technology, mostly from the United States. This trend is expected to continue in the future. Japan and Germany may also become more important as sources for Canada's technology imports, but greater distances and the weaker industrial or trade ties with these countries are likely to make the acquisition of technology from these new sources more difficult for Canadian firms.

Conclusion

Canada's technological performance has been relatively poor. Its weak R&D record is partly the result of the nature of its industrial structure. The share of R&D-intensive industries in the total Canadian output is very small relative to other industrialized countries. Another factor contributing to the smaller innovation effort is the relative absence of large, domestically controlled firms in industries that are R&D-intensive in Canada. A third factor is a lower propensity by Canadian firms to undertake R&D. However, the lower level of R&D spending by itself would not necessarily be of great concern if Canada were importing new technologies at a fast enough rate to ensure that its productivity growth was as fast now as it has been in the past.

But Canada also lags behind its major trading partners in the adoption and diffusion of new technologies. Shortages of skilled workers, the prevalence of small firms, the complacency of Canadian managers towards the training and skill development of their workers, and the short-term focus of Canadian business firms seem to have contributed to slower adoption and diffusion of new technologies.

Embracing Change

Canada remains one of the wealthiest nations in the world, but the *growth* in the country's real per-capita income has slowed down considerably over the past two decades, as productivity advance has weakened. This setback has disappointed many Canadians. Their inability to raise their standard of living has contributed significantly to current economic, social, and political tensions.

A competitive economy provides high-wage jobs, high employment, and rising real incomes. This is done by achieving progressively higher levels of productivity, rising at rates that are at least as rapid as those of the country's main trading partners. Productivity growth rates have slowed down in all industrialized nations since the first energy price shock of 1973, and Canada has been no exception.

What we have shown in this Statement, though, is that this slowdown has been unusually severe and long-lasting in Canada's manufacturing sector. In addition, manufacturing costs have fallen seriously out of line in recent years. Because manufacturing represents an important part of the Canadian economy – accounting for over 20 per cent of business-sector GDP and employment in 1990, and for about 75 per cent of both exports and imports of goods – both of these trends are alarming.

Serious problems also exist in Canada's traditional area of specialization – natural resources. The real prices of Canada's basic commodities and even of resource-based manufactures have been declining for much of the past two decades. There are two approaches to the solution of the natural-resource problem. If the decline in prices were offset by better rates of productivity growth, the returns to labour and capital could be kept at satisfactory levels. Our analysis shows that this has not happened. Alternatively, if production shifted towards industries where prospects for prices and productivity seem better and market demand is stronger, the overall performance would improve. Canada has, in fact, experienced a modest shift in this direction, although it is more a reflection of fast-growing demand in certain markets than of a shift in comparative advantage.

It is clear that both the manufacturing sector and the resource-based industries need to improve their productivity growth in order to reinforce their ability to compete and, ultimately, to maintain and increase the standard of living of Canadians. The same is true of the service industries, since they supply important inputs to the other sectors. A pattern of strong productivity growth in all sectors would go a long way towards alleviating social and economic stresses on millions of Canadians.

We recognize that because our analysis reflects events of the past – of the past decade, in particular – it includes a

backward-looking element. But we are also convinced that it provides important insights about the future – both about the risks of continuing with the "good old ways" and about the payoffs that will result if the required changes can be achieved.

The challenge, then, is to determine what kinds of changes, both in public policy and in private action, are required for Canadians to move back to a track of substantially faster productivity growth. In searching for the answers, we did not limit ourselves to the large body of research undertaken to assist us in the preparation of this Statement. We also drew on the results of related research that this Council and others have carried out in recent years, as will be clear in this final section. And we concluded that there is no magic potion – no single solution for what needs doing. What is required is a change in attitude and behaviour by virtually all Canadians – be they in management or in labour, in the private sector or in government, and wherever they may live. Improving productivity growth, and thus real incomes, will benefit all Canadians; achieving that goal will require the involvement of all sectors.

We sense that many Canadians have already begun to recognize the need for a transformation of this kind. We see many encouraging elements in the current direction of public debate on economic policy – the growing recognition of the limits to deficit financing by governments; the federal prosperity initiative; the growing cooperation between labour and business on such issues as training and adjustment; and so on. Perhaps most important, in this context, is the perception that leaders from all sectors increasingly understand the tight link between changes in real wages and productivity growth, and recognize that increases in real wages cannot be sustained unless productivity also improves.

Some of the proposals that follow are an extension of recommendations made in past Council reports. We note that almost all of the public-policy recommendations are aimed at the provinces as well as the federal government. Indeed, given the direction in which events are moving, both domestically and globally, there is a considerable emphasis on the need for more effective federal/provincial cooperation. This reflects, in part, the fact that the provinces have important jurisdictional responsibility in areas that we have highlighted; it also reflects the fact that important issues often cut across the boundaries set out in the constitution.

With all of this in mind, we have outlined our conclusions in the form of four interrelated messages. These four messages are discussed in the remainder of this Statement.

Message 1

Canadians have not responded as quickly and effectively to changes in their economic environment as they need to. If the current pace of adjustment is maintained, Canada will begin to fall behind its trading partners. It is essential that Canadians learn to welcome change.

Message 2

Embracing change requires new attitudes in all segments of society. Canadians need to find new ways of meeting challenges and new approaches to solving problems in both the private and public sectors. In particular, business and labour must become more flexible in the face of a rapidly changing environment.

Message 3

Adjusting quickly and effectively to change requires government policies that set the appropriate framework – a necessary though not sufficient condition for achieving better productivity performance. In this regard, there have been important advances in recent years. But there is need for further improvements if Canada is to return to more robust productivity growth.

Message 4

Learning to welcome change more openly entails a faster pace of adjustment. This will result in severe hardships for some people and some communities. Overcoming these hardships will require substantially increased investments in skill development, training, counselling, and mobility.

Slower Adjustment

Message 1

Canadians have not responded as quickly and effectively to changes in their economic environment as they need to. If the current pace of adjustment is maintained, Canada will begin to fall behind its trading partners. It is essential that Canadians learn to welcome change.

Firms and workers face growing international competition. Technological changes and the internationalization of business are increasingly lessening the relevance of borders and distance as barriers to trade and investment. The nature of the production process is changing as a result, with product life cycles becoming shorter and technology shifting from mass production to flexible specialization. The fastest-growing markets are those for knowledge-based products and customized services.

These structural changes are exerting strong adjustment pressures on the Canadian economy. By adjustment we mean not only the traditional need to shift capital, labour, and other resources out of product and service lines where industry is unable to make satisfactory profits and pay high real wages; we also include the need for continuous adaptation in the firms that are able to survive and prosper. For example, technical innovation in successful firms frequently requires alterations in workplace organization, the development of new skills, and at times, the shedding of labour. The business world increasingly values effective entrepreneurs and knowledgeable, highly trained workers; people and institutions lacking the appropriate skills and the requisite flexibility will be at a disadvantage and may suffer hardship.

We are aware that the economy undergoes a large amount of job and firm turnover in the normal course of events. But in themselves, volatility in labour markets and high rates of firm "births" and "deaths" are not evidence of effective structural adjustment. Indeed, the results of the last two decades indicate that, all too often, workers and firms are not taking, or are unable to take, the actions needed to achieve the productivity gains that would lead to continuous growth in real incomes. These conclusions emerged from every aspect of our research, whether the focus was on productivity, on costs, on innovation, or on trading patterns – and regardless of the methodology used. Indications can also be found in past research of the Council and others. While each piece of evidence is not, in itself, indicative of an overall problem, the whole is more revealing than the sum of the parts: taken together, the various findings suggest an economy that is not flexible enough.

Among these individual pieces of evidence:

- In manufacturing, productivity problems have been more severe in Canada than in the other G-7 countries for most of the past 20 years. Some countries have caught up to, and pushed past, Canadian productivity levels. This problem pervades almost every manufacturing industry.

- Canadian industries responded less effectively than their foreign counterparts to the energy price shocks of the 1970s.[12] Despite large increases in the domestic price of energy, the energy/output ratio continued to rise for several years.

- Compared to their counterparts in many other countries, Canadian manufacturers have been slower to respond to upward pressure on the exchange rate by adopting measures to make production more efficient.

- Canada's industrial structure has not been changing quickly. If the industries in which Canada enjoys comparative advantages had high rates of productivity growth and rising relative prices, the slowness of change would be of no concern.[13] But the opposite is true. Canada specializes in industries that have been experiencing relatively slow productivity growth and declining relative prices.

- High rates of consumer price inflation, which became imbedded in Canadian manufacturing wages in the 1980s, have contributed significantly to the weakening of the cost position in that sector. The difficulties of containing inflation can be attributed to the poor short- to medium-term trade-off that exists in Canada between unemployment and inflation. The lack of a sense of common interest among business, labour, and governments certainly contributed to the poor trade-off. (These issues were discussed in the Council's 27th Annual Review.)

- The commitment of Canadian business to training and organizational changes remains tepid despite numerous reports stressing their importance.

- Manufacturers adopt advanced technologies more slowly than their foreign competitors.

- Canadian business does relatively little R&D, compared with that in many other industrialized countries. This is true in natural resources as well as manufacturing.

- At the governmental level, despite recent progress, there remain restrictions impeding the free flows of goods, services, and labour between provinces. The reluctance to deal conclusively with these obstacles stretches back many years.

That is not to deny, of course, that the Canadian economy does adjust. Indeed, in other contexts we have lamented the fact that much of the labour-force turnover has been swelling the ranks of the unemployed. We are convinced, however, that adjustment is often less the result of decision makers anticipating and planning for change than a forced adaptation to it.

The evidence of rigidity is sufficiently widespread to indicate that the problems cannot be exclusively industry-specific. It is also clear that the difficulties – those of the manufacturing sector, in particular – are not simply related to the recession. Instead, they are systemic. Some of the problems, we believe, resulted from misleading signals given by the public sector – that is, policies aimed at preserving the status quo in specific industries, examples of which will be discussed below. Other problems reflect the way business and labour do things – perceptions and responses that indicate an unwillingness or an inability to

respond to the rapid changes in the economic environment. Limited competition could be an explanation in some cases. But Canada's adjustment difficulties may also have some of their roots in intangible characteristics unique to this country, such as deep-rooted social and cultural attitudes, corporate management styles, the current pattern of industrial relations, or a weak commitment to innovation and learning. Whatever the exact cause, we believe that both the public and the private sectors contribute to the problem; both must also be part of the solution.

A Need for New Attitudes

Message 2

Embracing change requires new attitudes in all segments of society. Canadians need to find new ways of meeting challenges and new approaches to solving problems in both the private and public sectors. In particular, business and labour must become more flexible in the face of a rapidly changing environment.

Because the challenge is systemic, it is pointless to single out one set of institutions – government, business, labour, the educational system, or any other sector of society – as being responsible for the slow productivity growth of recent years. These institutions are interdependent; given Canada's high *level* of productivity, it is evident that much of what they have done in the past has been done well. Today, however, sweeping changes are taking place at an accelerating pace in the world economy and in society at large. As a result, there is a need for a corresponding change in attitudes.

The change in attitudes that we are calling for, however, does not require a shift away from traditional concerns with community and equity, although in some cases more effective means of achieving these goals may be needed. We also know that changing behaviour and perceptions can be a long and often difficult process. Nevertheless, the greater the number of people who understand the need for change and the greater the number of initiatives that are tried, the easier the process will become and the greater will be the benefits.

Our first key behavioural change focuses on teamwork involving all the main players in the Canadian economy. **There must be an intensified effort, largely from the bottom up, to enhance cooperation and trust between all groups in society, between institutions in the private sector – labour, business, educational, and social groups – and between these institutions and governments. Such efforts must be part of an on-going process, not just a surge of cooperation when times are tough.**

There is no single formula for building such relationships. They must emanate principally from those in the regions, institutions, and communities who are closest to economic reality. Given the diversity of Canada, there are likely to be many models of "bridge-building" and many forms of cooperation.

Our second key concern relates to public attitudes towards the role of market forces in allocating resources. Much of the resistance to market forces that is now found has to do with the desire of industries, firms, and individuals to protect themselves against change by reducing competition. When such attitudes persist, then the lower costs and wider choices that flow from market mechanisms are lost and adjustment is slowed. Of course, there are important situations where the public interest requires that a regulatory framework establish the contextual setting within which markets function. However, **we are arguing that in general, regions, communities, industries, firms, and individuals must learn to advance their economic interests in ways that impose fewer costs on others.**

In hindsight, it has become obvious, for example, that the "made-in-Canada" energy pricing policies of the 1970s and early 1980s sent inappropriate signals to Canadian industry and slowed down the process of adjustment that was essential for better productivity performance. Encouraging heavy industries to locate in Canada by providing artificially low electricity prices is another illustration.

Still other examples have been documented in the Council's study of such measures as the federal Pulp and Paper Modernization Program and the Shipbuilding Industry Assistance Program (see *Managing Adjustment*). The stated objective of buying time for these industries to enable them to revitalize their operations in order to meet strong foreign competition was generally not met. These particular programs have since been abandoned. But they have their 1990s counterparts in current efforts by some governments to avoid painful closures of important firms in the manufacturing and resource sectors.

Coping with increased competition requires strengthening the resolve to improve productivity and costs. Both labour and management must assume responsibility in achieving this, and it is in the interest of both that they learn to work together more effectively. Also required is a commitment to quality in all aspects of business – from the materials used in a product to advertising, sales, and service. Important elements in such a commitment are the presence of trained and flexible managers and workers; customer orientation, with continual monitoring of customer needs and problems; and constant interaction among employees of the company.

The third key change that we advocate concerns attitudes about innovation. **Canada needs a national commitment to innovation. It must recognize that innovation is an integrated and interactive process, involving not just new technology but also adaptations in workplace organization and on-going skill development.** Business and labour, in particular, must recognize the significance of this interrelationship. This means understanding that much more than R&D is involved in successful innovation. Without organizational change, greater collaborative effort, and skill development, much of the potentially positive impact of technological change will be dissipated. These themes were developed by the Council in *Making Technology Work*.

New approaches to workplace organization will induce flexibility. One example is the redesign of job classifications to meet the needs of increased flexibility and changing technology while improving job satisfaction at the same time. Another is the type of "flatter" organization structure that, by reducing the number of management levels, can improve communication and speed decision making. Restructuring labour/management relationships by ensuring workers' greater input into the decisions that have a direct influence on their work – indeed in some cases endowing them with the authority to act – perhaps in conjunction with pay levels that are partly linked to firm performance, is another example. In *Two Steps Forward*, our case studies showed that changes in workplace organization often led to improvements in the working environment, increasing productivity, and worker satisfaction.

Skill development is so important that we give it special emphasis here as the fourth important change that we advocate. **There must be an intensified commitment to human-resource development, reflecting the growing importance of skills and knowledge for effective participation in the global economy and for quick adjustment to change.** A society that invests heavily, and effectively, in the education and training of its people enhances its efficiency and flexibility. And in doing so, it reduces the hardships imposed by change. Canada already invests heavily in education but devotes substantially fewer resources to continuous learning. Canadians need to invest more wisely and with greater awareness of the changing economic context. This very important issue will be dealt with in two separate statements – one on education and training, and one on poverty – to be released later this year.

The fifth important attitudinal shift consists in not only adjusting to the forces of change but also in going out into the world and seizing the opportunities presented. **Canadians need to develop a willingness to look outward and, especially, to pursue large and important markets outside North America. And they must be more willing to go beyond their traditional areas of specialization.** This may not come easily. For decades, Canada's economic interest has focused on the United States, which was the unquestioned economic leader of the world. Geographic proximity and cultural affinity made it easy for most Canadians to absorb the advanced technical and management practices developed in that country.

Undoubtedly, the United States will continue to be of vital importance for Canadians. But other countries and regions, including the European Community and the Asia/Pacific region, have assumed great importance in the world in terms of the size of their markets, their sophisticated demand, and their technologically advanced industries. Venturing more strongly into the markets of these countries, with their different cultures and demands, will help Canadian firms of all sizes to improve their efficiency and dynamism, and develop new areas of specialization. In this connection, a research project focusing on Canada's economic relations with the Asia/Pacific region is currently under way at the Council.

Supportive Government Policies

Message 3

Adjusting quickly and effectively to change requires government policies that set the appropriate framework – a necessary though not sufficient condition for achieving better productivity performance. In this regard, there have been important advances in recent years. But there is need for further improvements if Canada is to return to more robust productivity growth.

A favourable economic environment has two components – strong and stable economic growth; and structural characteristics that foster effective adjustment with minimal dislocation to people, institutions, and the environment. Strong and stable economic growth makes selling easy, because favourable demand conditions result in greater utilization of productive capacity, expansion of employment, benefits from scale economies, and increased profits and investment.

Structural characteristics include taxation, the international and internal trading environments, the degree of competition, and the availability and quality of the infrastructure. Many of these characteristics can be fashioned in Canada's best interest. Here we discuss important aspects of some of them; others will be examined in future Council publications.

In assessing how public policy can help to improve economic performance, we are especially sensitive to the fact that it is becoming progressively easier for capital and highly skilled labour to leave a jurisdiction (i.e., a country or a province) in which they are not comfortable. Policies aimed at strengthening competitiveness must take this freedom of movement into account. If the policy environment is hostile to capital and skills, they may relocate to friendlier climes. In that sense, Canada's policy framework competes with that of other countries.

We believe that the public-policy framework has, in fact, been improved in recent years. The movement towards a more neutral and transparent sales tax system is one example. Another is the trade agreement with the United States, which has improved the security of access to that country's market.

In the discussion here, we focus on three aspects of public policy that are necessary for a competitive economy:

- macroeconomic policies, as they affect competitiveness and trade;
- policies promoting technological innovation; and
- policies to open up external and domestic markets.

Macroeconomic Policies, as They Affect Competitiveness and Trade

Earlier in this Statement, we expressed concern about the risks that arise when the exchange rate is overvalued for a sustained period. If a lower external value were achieved – without triggering demands for wage increases to offset the higher import prices – Canadian manufacturers would find it easier to sell in domestic and international markets. And the sale of commodities that are priced in U.S. dollars in the world market would become more profitable to the firms that produce them.

The key question is how to achieve a more appropriate value for the Canadian dollar, recognizing that many influences are at play and that one cannot have one exchange-rate value to enhance international competitiveness and another to achieve other macroeconomic goals. With respect to the latter, it appears to us that the most viable route will come from success in current federal efforts to reduce both inflation and government deficits. To achieve this, continued fiscal restraint by the federal government, supported by greater fiscal restraint by the provinces, is vital. Over time, this will lead to lower interest rates and less government borrowing abroad. Accordingly, **we support the level of restraint apparent in the fiscal stance of the federal government and most provinces. We believe that it is an essential element in developing an improved framework for Canadian industry to compete, including a lower value of the Canadian dollar.**

With respect to fiscal policy, we also believe that, in the on-going implementation of restraint, governments should make every effort to ensure that the burden is shared fairly and that the poor, in particular, are not affected unduly. As for the implementation of monetary policy, it is focused heavily on meeting the inflation targets that have been jointly established by the Minister of Finance and the Governor of the Bank of Canada. To the extent that it is possible to achieve some downward movement in the exchange rate without unreasonably jeopardizing these targets, we believe this could be very constructive.

We recognize that there are risks in an approach that relies on a changing mix of fiscal and monetary policies. In particular, lead/lag relationships associated with the working of monetary and fiscal policies could worsen demand conditions in the short term. A restrictive fiscal policy depresses domestic demand rather quickly. On the other hand, the beneficial effects of an easier monetary policy – lower interest rates and a lower exchange rate – might not be apparent for some time, adversely affecting consumption and investment over the short term.

In addition, the increased confidence of foreign investors in the Canadian economy, resulting from success in meeting inflation targets and achieving further large reductions in the budget deficit, could actually raise the value of the Canadian dollar in real terms – that is, it could lead to an increase in the nominal rate of the dollar that would be proportionately greater than what has been "earned" by the improvements in inflation performance relative to the United States – thus worsening the cost position of Canadian manufacturers in the short term.

Other ways of dealing with the exchange-rate overvaluation are frequently discussed, but we believe they are not workable, at least at this time. One suggestion is to devalue the dollar, but we doubt that this would have the desired effect unless it were a part of a broader strategy to restrain inflationary pressures. A variant of this approach would consist of a negotiated agreement between the federal government, the provinces, business, and labour under which commitments to wage restraint by labour and to high levels of investment by business (in training, in capital, in research and development) would be associated with a willingness to pursue an easier monetary policy that would

allow the dollar to move downward towards the value supported by economic fundamentals. To develop the consensus required for such a negotiated arrangement would be a major challenge. Such an approach would likely require additional fiscal restraint by governments.

A second variant would involve unilateral action by the federal government to impose wage controls – and perhaps controls on dividends and prices – to ensure that inflationary pressures are contained. This could create immediate positive results in terms of Canada's cost structure. But, in all likelihood, it would alienate the labour movement, parts of business, potential investors, and perhaps some provinces. The objective of movement towards more consensual arrangements would be set back. In addition, pent-up wage and cost pressures could create new inflationary pressures after removal of the controls.

Yet another approach would be to adopt a fixed exchange rate. It has been argued that such a measure would remove disruptions to trade and investment flows associated with excessive fluctuations in the exchange rate. Eventually, it would lower Canadian interest rates because of a reduced risk premium. The Canada-U.S. Free-Trade Agreement and the proposed North American free-trade area strengthen the case for a stable value of the exchange rate.

But there are drawbacks to this approach. An exchange rate fixed at a lower level could set off a price/wage inflationary spiral just like any other depreciation. More importantly, under a fixed-rate regime the Canadian monetary authorities would lose control over domestic inflation and interest rates, which would largely be determined by developments in the global economy, especially in the United States. As a consequence, the stabilization of macroeconomic fluctuations and the adjustment to external and internal shocks would have to come mainly from changes in domestic fiscal policies and/or adjustments in domestic prices and wages. Large swings in commodity prices and excessive capital flows would also weaken a fixed exchange-rate system. It is worth noting that for a fixed-rate system to be successful, it must be accompanied by a commitment to fiscal discipline. If it is not, then either the rate will have to be adjusted frequently or the system will break down. We believe the issue of exchange-rate regime requires further study in the years ahead in the light of the changing structure of the global and domestic economy.

We noted above our belief that a better balance between fiscal and monetary policy was the appropriate way to deal with the overvaluation of the dollar at this time. Restraint on the part of the federal government has included reductions in the rate of increase in transfer payments to the provincial governments, which along with local governments and hospitals, now spend much more than the federal government. Over the medium and longer terms, the provinces will bear the burden of determining the best way to deal with these pressures in the health-care, social-service, and education sectors. In effect, they will have to find ways of achieving improved productivity in these sectors. If the provinces do not continue to pursue restraint and efficiency measures, the current macroeconomic imbalances in the economy will persist and will have an adverse impact on real-wage and employment levels over the medium and longer terms.

More generally, sound macroeconomic management demands better cooperation between the federal government and its provincial/local counterparts on budgetary issues. The prospects for effective coordination would be better if the mechanism for establishing the fiscal framework were more open, with both levels of government being exposed to the "give and take" of interest groups and experts before final decisions are made. This approach would also enable business and labour to have a more meaningful input into the budgetary process. It would encourage all parties to consider the constraints facing the economy and to focus on setting priorities. Over time, the enhanced coordination in macroeconomic management would provide a better framework for productivity growth and competitiveness.

Promoting Technological Innovation

We have stressed that innovation requires the adoption of new technologies and their widest possible diffusion. Yet innovation policy in this country pays much less attention to these requirements than to R&D. This was a major finding in *The Bottom Line*, an earlier report of the Council.

The diffusion of new technology is linked to the degree of awareness that such technology exists and to the presence of an environment that is competitive enough to encourage its active exploitation. Where awareness already exists, problems of diffusion could lie in the degree of competition in the Canadian marketplace. There are two elements to this. One is the general level of competition that encourages firms to seek cost-reducing measures – a subject that will be discussed later on. The second element has to do with the cost of new technology itself. Only anecdotal evidence is available on this question, but it suggests that advanced manufacturing technologies cost much more in Canada than in the United States. We urge the federal government to conduct a survey comparing the prices of such technologies in Canada and elsewhere. If the results confirm the anecdotal evidence, measures to strengthen price competition will be necessary.

Slow diffusion is probably most serious for Canada's small and medium-sized enterprises. They need special help in tracking trends in technologies and markets, evaluating new machinery and equipment, securing licenses, training their employees, and obtaining new technologies from abroad. Programs designed to promote these objectives already exist. The National Research Council's Industrial Research Assistance Program (IRAP) provides advice and assistance to Canadian firms in technology diffusion. Federal and provincial departments and agencies also provide technical assistance and support to industry.

We have not done independent evaluations of the effectiveness of these technology-diffusion programs, although the National Research Council's evaluation of IRAP has been favourable. However, the rapid rate of change in the technological environment makes it important that they be continuously monitored. More generally, we believe that federal and provincial policies should put much greater emphasis on the adoption and diffusion of new ideas in industry.

There is also a broad consensus on the rationale for government support of industrial R&D. Market failures result in underinvestment in industrial R&D by private firms because the latter cannot always fully appropriate the benefits. Accordingly, governments in all industrialized countries (including Canada) provide large direct and indirect support to industrial R&D. In 1990, the federal government directly funded – in the form of grants, contracts, and intramural performance – 30 per cent of Canada's total R&D spending of $9.1 billion. Indirect support is also substantial. The government allows industry to depreciate all R&D expenditures immediately and gives firms a 20- to 35-percent tax credit, depending on company size, location, and ownership. In conjunction with provincial tax incentives, tax supports cost governments roughly $2 billion in terms of forgone revenue. In other words, through the tax system governments pay for more R&D by industry than industry itself does.

This tax treatment of R&D expenditures by the private sector may be the most generous in the world. The problem of low R&D expenditures by industry clearly does not lie in the overall amount of government support for this activity. Therefore, it must lie elsewhere – either in a weak commitment to research on the part of the industrial sector or in an inadequate composition of the government funding. In any event, if management in Canadian industry has no commitment to research, then it is unlikely that governments can alter its behaviour by offering incentives. Accordingly, **we would recommend a critical review of the present R&D tax-credit program, with a view to assessing its effectiveness in promoting R&D and innovation in industry.** We would also make two further points that flow from our research: 1) it appears that the greatest social benefits flow from long-run, basic research; and 2) one way to promote such research is through cooperation between industry, governments, and the universities. This is one way to share costs and risks while building the critical mass required to promote technological development.

Trade Policies to Open Up External and Domestic Markets

The current Uruguay Round is nearing its end – a draft text for a multilateral trade agreement put together by the GATT Director-General is now the subject of the final stage of negotiations. The proposed agreement contains important advances in a number of areas including the first-ever multilateral trade agreement on services, the incorporation of rules on various aspects of trade-related intellectual property, the phased-in inclusion of trade in textiles and clothing within the GATT rules and, with respect to agriculture, a program for reducing export subsidies and internal supports and increasing market access. Aside from these new areas, the draft agreement reduces other tariff and nontariff barriers, and fosters a greater measure of discipline in the use of industrial subsidies and of anti-dumping and countervailing duties. Negotiations based on the draft text will continue at least until the end of March, with agriculture still being the major subject of contention.

Historically, Canada has had to rely on access to world markets because of its relatively small domestic market. As a consequence, it has played an active role in the GATT negotiations. Many observers have cited the benefits of improved market access – the possibility of achieving greater economies of scale, the positive impact of greater competition, security from trade-distorting actions, the ability to undertake accepted means of redress when such actions occur, and so on. Canadian industries need to sell their products abroad, and freer trade has facilitated that.

Further improvements in market access are needed, however. As tariffs come down, nontariff barriers – some old (e.g., import quotas), some new (e.g., voluntary export restraints) – become more significant impediments to trade. These barriers are slowing down the growth in international trade. Also, many products that reflect Canada's comparative advantage still face high trade barriers in some of the fastest-growing markets of the world, such as the countries of the Asia/Pacific Rim area. (Similarly, many of the products in which these countries specialize face high trade barriers in Canada.) Indeed Canada's ability to sell some of

its major exports, notably wheat, has been damaged by the lack of clear rules to discipline governments that distort trade.

Beyond the Uruguay Round, further trade liberalization through multilateral negotiations is likely to become more difficult as the sheer complexity and scale of the process increases. As a result, some issues will be tackled, at least initially – and perhaps most successfully – on a bilateral or regional basis rather than through multilateral negotiations. At the same time, many issues will continue to require solutions at the multilateral level. Thus we believe it is worthwhile for Canada to pursue both multilateral and bilateral approaches to trade negotiations. The promotion of direct-investment linkages can also contribute to an improvement in Canada's penetration of foreign markets, since such linkages often complement trade relationships.

Growing economic interdependence and the increasing need for large integrated markets add to the complexity of international negotiations by blurring the distinctions between domestic policy and international trade policy. The trend is for governments to take a much stronger interest in the domestic policies of their trading partners, thus reinforcing the tendency to harmonize policies with respect to regulation, subsidies, public ownership, and public procurement. For this reason, international negotiations in the future are likely to impinge more than ever on provincial authority in areas like economic development. **We therefore recommend that federal and provincial governments prepare for trade pressures that impinge on domestic policy choices.** This preparation would include development of the necessary coordinating mechanisms as well as joint evaluations of specific areas where policy pressures occur.

Internally, competition is reduced by federal and provincial barriers to the free flows of goods, services, labour, and capital between the provinces. It has been estimated that about 2 million jobs depend directly on interprovincial trade alone. Reductions in these barriers between the provinces will foster more effective adjustment, improve scale economies, stimulate dynamism, and ultimately enhance productivity. In the Throne Speech last year, the federal government committed itself to launching a process whereby all interprovincial barriers would be eliminated by 1995. There have been some positive developments, but quicker and stronger action is needed. Accordingly, **we urge that the federal and provincial governments make a new commitment to remove interprovincial barriers and to prevent new ones from being created.**

When the forces of competition are left to operate, inevitably some firms fail. Allowing firms, especially very large ones, to close down is a painful process for all concerned, but it also avoids drawing more capital into activities that do not have long-term viability; where such misguided investments are avoided, capital and skilled managers, engineers, and others are freed for alternative uses. Thus **we recommend that governments avoid bailing out firms through subsidies or import quotas when they have little prospect for longer-term efficiency.** When such subsidies or quotas *are* used, there should be clear criteria with respect to the rationale for using them, as well as a commitment to a public evaluation of their effectiveness in light of these criteria, and to a "sunset provision" for terminating the assistance.

Beyond the barriers to interprovincial trade and the inefficiencies resulting from government support to firms without long-term viability, there are rigidities in factor and product markets that limit responsiveness to market signals and hinder flexible adjustment by workers and firms. *Canadian Unemployment* (a compendium of papers published by the Council in 1991) described the symptoms of rigidities in the Canadian labour market, such as the persistence of long-term unemployment and of regional disparities in joblessness, and the presence of obstacles in the way of labour-force mobility.

The changes in behaviour alluded to earlier can play a role here. For example, greater flexibility in compensation arrangements, accompanied by worker participation and worker/management dialogue, will help to moderate these rigidities. Ultimately, however, the most effective approach for improving the functioning of the labour market consists of active measures to help workers adjust – by acquiring new skills, maintaining old ones while unemployed, or moving to other occupations, industries, or regions.

Overcoming the Hardship of Adjustment

Message 4

> **Learning to welcome change more openly entails a faster pace of adjustment. This will result in severe hardships for some people and some communities. Overcoming these hardships will require substantially increased investments in skill development, training, counselling, and mobility.**

In suggesting that Canadians embrace change, we are sensitive to the painful pressures they have already experienced in recent years as a result of global trends and of changes in domestic policy. The growth in competition from Japan and the newly industrialized countries of Asia, as well as the large deterioration in the cost position of Canadian manufacturing relative to its U.S. equivalent, have imposed

severe pressures on Canada's labour market. Significant declines in relative prices, especially in the natural-resource sector, have created serious difficulties in rural communities and single-industry towns. Evolving environmental standards, initiatives in tax reform, privatization, and deregulation have added to these adjustment stresses.

Many symptoms of the dislocation caused by change are visible. Unemployment was high throughout the 1980s. Long-term unemployment rose. At lease in part, these difficulties were the result of the mismatch between the skills that were required and those which were available in the labour market. Despite persistently high unemployment, a large number of jobs remain unfilled or become filled only through immigration. Even during the 1990-91 recession, employers continued to complain of skill shortages.

Thus human-resource development policies must be a fundamental cornerstone of a strategy of national competitiveness that aims to overcome these stresses. When communities and workers have confidence in their future security, adjustment will be easier. In this regard, we repeat **that when firms or industries are hurt because of international competition, the best response for government is normally to support labour adjustment, not to provide subsidies in an attempt to prop up businesses that lack long-term viability.** We recognize that considerations of regional development and diversification are often motivations for government support. Despite these efforts to sustain declining sectors and firms, more often than not the affected work force continues to shrink and the workers who have retained jobs often find that their positions remain precarious. If the large sums spent in resisting change had been invested in skill development and worker mobility, they would undoubtedly have improved the productive efficiency of the economy and the long-term employment prospects of the individuals affected.

What must be done? The Council has outlined its suggestions in past reports and Statements. We believe that federal and provincial labour-market strategies must continue to give increasing emphasis to skill development and employability as primary goals. In *Good Jobs, Bad Jobs*, we proposed a gradual transformation of the unemployment insurance system into one with a greater focus on integrating people into paid employment through a much greater commitment to skill development, mobility, and counselling. Since then, our research on the dynamics of poverty has reinforced this view. **We believe that further substantial changes to the basic structure of Canada's income-security system are necessary; in particular, there must be a much stronger commitment to the reintegration of workers into productive employment.** Given these needs, we do not consider it desirable to reduce overall spending in this area. But spending must be smarter. Employability and income-security programs must be redesigned so as to foster more investment in "active" measures and better work incentives, and to reduce poverty. We are pleased to see provincial and federal governments moving in this direction. But we also believe that swifter and bolder action is called for in order to enhance the security of workers.

In addition, as noted first in *Good Jobs, Bad Jobs*, **we believe that there is a need for legislative measures to improve the possibilities of a smooth transition to a new job for employees who are about to be laid off.** Statutory requirements for minimum advance-notice periods, with the length of the periods to be linked to the number of people who are to be laid off for extended periods or permanently, are now found in most Canadian jurisdictions. Our proposals, adopted from the de Grandpré report, would improve advance-notice requirements and would thus substantially improve the prospects for finding new jobs quickly. A related issue is the need for all jurisdictions to establish guidelines providing for the creation of committees involving management and labour representatives to develop and implement re-employment packages when a major layoff is anticipated.

Communities also have a role to play in coping with adjustment. Municipal governments or local-development organizations can help to build the human-resource and information infrastructures needed to encourage and support economic initiatives and thus facilitate adaptation. As we noted in *From the Bottom Up*, this role may be particularly important in small communities and remote settlements where the private-sector institutional infrastructure may be weak.

Conclusion

It is our sense that Canadians are becoming much more aware of the kinds of structural changes that will be required if they are to continue to enjoy living standards that are among the very highest in the world. Living standards, of course, are largely a function of wages which are, in turn, determined mainly by productivity.

Returning to a faster productivity growth track is the challenge we face. Much of what needs to be done is tied up with the education and training of our people, a subject we shall deal with separately in our next Statement. What we have argued here is that our current productivity slowdown is linked to attitudes and behaviour that have become widespread in our society – attitudes and behaviour that have been too resistant to change and too heavily adversarial.

We need more competition. But we also need more cooperation.

Canadians need a new mindset as well. Fortunately, there are signs that the new attitudes are beginning to take root. Useful experiments in business-labour cooperation are under way. More people are aware that solutions must be developed and implemented within the firm – through better management, improved cooperation with labour and education institutions, and, in some cases, cooperation with other firms. More people understand that governments do not have all – or even many of – the solutions to the competitiveness conundrum. And governments themselves are more aware that they need to promote both competition and cooperation.

But these attitudes are not yet pervasive enough to affect the performance of the whole economy. Time is being wasted because the managers and labour leaders with the new mindset are too often stymied by colleagues and counterparts who are still locked into the old style of confrontation. And there remain those who believe larger deficits and higher inflation are the best and easiest way out, although we believe their numbers are diminishing.

Canadians do not have time to waste at this stage. Improving, or even maintaining, the high living standards that we now enjoy will require a transformation – a commitment to embracing change in a fast-changing world. To achieve that, we shall have to pull together; we shall have to work as a team.

Comments

Pierre Paquette and Marcel Pepin

While we concur with the thrust of the Economic Council of Canada's Statement, *Pulling Together* – that Canada faces significant competitiveness problems in the world economy – we are unable to support some of the measures for change put forward in the document's "messages."

For example, we cannot support the Council's endorsement of *fiscal restraint* as the best way to improve the environment in which Canadian industry must compete, in particular by lowering the value of the dollar (Message 3, macroeconomic policy). What the Council is saying, in other words, is: let governments reduce their borrowing, and markets will do the rest by lowering interest rates.

We believe the changes that have occurred in interest rates cannot be attributed solely to market forces. Largely through its restrictive monetary policy and its stance with respect to exchange-rate movements, the Bank of Canada has contributed to upward pressure on short-term rates and kept real returns high over the past few years.

It is common knowledge that the federal government's revenues are now higher than its program expenditures (i.e., other than debt service). The amount of interest being paid on that debt is directly attributable to the Bank of Canada's decision, backed by the federal government, to use monetary policy as a weapon in the fight against inflation. Under current monetary policy, then, debt is fuelling its own growth.

Moreover, the Council pointed out in its 28th Annual Review, *A Joint Venture* [1991], that, given a favourable economic context, "current federal taxes seem to be higher than what would be required to meet both the government's projected expenditure requirements and relatively ambitious targets for reducing the level of its debt over the long term" [p. 63]. Thus the way to attain lower nominal and real interest rates is not through further fiscal restrictions but through *a major shift in policy by the Bank of Canada*, considering that the inflation rate (excluding the effect of the GST and regulated prices) fell below 2 per cent in 1991.

Unfortunately, the central bank still shows no inclination towards a redirection of policy, as evidenced by the fact that it let the bank rate rise in late 1991 in order to halt the decline in the Canadian dollar.

The Economic Council has amply demonstrated in the past that the high dollar is harmful to the Canadian economy; it is not necessary to rehash those arguments here. But the Council should certainly have included in its messages a reminder that *a strong currency reflects a competitive economy, not the other way around*, despite what some members of the government and the world of finance appear to believe. One often hears government ministers argue that a high exchange rate forces companies to improve their productivity performance. We agree that a devaluation of the dollar, which would reduce the selling prices of our products in foreign currencies, would bring no lasting solution to the problem of Canadian competitiveness. However, what Canada needs at the present time is not devaluation, but a return to an exchange rate that reflects the actual value of the Canadian dollar on international currency markets.

The current exchange-rate policy of the Bank of Canada only serves to further weaken the structure of our economy by dampening investment and aggregate demand, thus jeopardizing our exports and encouraging speculation against the Canadian dollar. This policy leads to high unemployment, which tends to prolong the government's fiscal crisis. In short, the approach advocated by the Council for reducing interest rates and the value of the Canadian dollar, particularly vis-à-vis the U.S. dollar, is wrong.

Furthermore, does anyone seriously believe that fiscal restraint can be pursued without compromising the integrity of our social programs, without maintaining wage restrictions in the public service, and without impinging upon the government's ability to carry out new initiatives? We doubt it.

Finally, we would like to comment briefly on the proposal of "restructuring labour/management relationships by ensuring workers' greater input into the decisions that have a direct influence on their work" [p. 47].

It seems to us the Council does not go far enough in emphasizing the need for this restructuring process and the scope that it should have. It is a process that requires awareness of certain conditions – the need for economic, financial,

and organizational *transparency*; the need for labour and management to reach a *consensus* on goals, priorities, and ways and means; and the *need* to bring all aspects of the firm into question. It is the overall organization of the firm that must be challenged, not just this or that aspect of production. Any attempt to challenge only part of the firm's operations is bound to fail.

Ken Woods

Generally, the Statement on competitiveness is well argued and documented. The Council suggests many viable alternatives to improve Canada's competitiveness compared to the global marketplace; I lend my full support to those portions of the Statement.

However, I have a great deal of difficulty – and consequently cannot support – the levels of restraint associated with the fiscal stance of the federal government. Those policies have resulted in lower interest and inflation rates, but at what and whose expense?

To be fair, our current economic malaise cannot be blamed solely on the policies of the federal government. The macroeconomic picture is far more complicated than that. To some degree, business, labour, and government have all had their input to the existing horrible situation.

Be that as it may, there is no tangible proof to Canadians, particularly the unemployed, that the restraints imposed by the federal government are working. Quite the contrary, by floating the dollar to its highest value in many years, our industrial base has been decimated and hundreds of thousands of jobs in a once thriving manufacturing industry have disappeared. Many of these jobs will never return.

Investor confidence has been lost and the confidence of those still fortunate enough to have a job has also been seriously shaken.

Notes

1 With the exception of automobiles and power-generating equipment, for which Canada already has a comparative advantage, the average revealed comparative advantage of "machinery and transport" and "miscellaneous manufactured articles" (sectors 7 and 8 of the Standard International Trade Classification) was 0.4 in 1987-89, unchanged from its 1971-73 level.

2 However, the removal of the manufacturers' sales tax and the associated decline in prices have reduced by about 2.5 percentage points the negative impact of the deterioration in cost effectiveness on manufacturing trade and output performance.

3 See John Baldwin, Tim Dunne, and John Haltiwanger, "Job creation and destruction in the manufacturing sectors of Canada and the United States," a paper prepared for the American Economic Association Meetings and the North American Economics and Finance Association, New Orleans, 3-5 January 1992.

4 There is fairly broad agreement among economists about which factors did *not* contribute to the productivity slowdown in the industrialized countries during the post-1973 period – in particular, insufficient spending on R&D, a slower rate of innovation, deterioration of worker morale, growing unionization, depletion of natural resources, growth of the government sector, the growing share of women and young people in the labour force, or a fall in the rate of growth of educational levels are generally thought to have had little or no influence. See, in particular, Economic Council, *Strengthening Growth*; A. Eglander and A. Mittelstädt, "Total factor productivity: macroeconomic and structural aspects of the slowdown," *OECD Economic Studies*, no. 10, 1988; G. Stuber, "The slowdown in productivity growth in the 1975-83 period," Technical report no. 43, Bank of Canada, Ottawa, 1986; and C. J. Morrison, "Unravelling the productivity growth slowdown in the United States, Canada and Japan: the effects of sub-equilibrium scale economies and make-up," Working paper no. 2993, National Bureau of Economic Research, Washington, D.C., 1989.

5 Note that the substantial rise in employer payroll taxes since 1989, especially that caused by large increases in health-insurance premiums in Ontario, have not been incorporated into our calculations.

6 In this approach, because the exchange rate is the adjustment mechanism, the costs of adjustment are widely shared – for example, everyone who buys coffee, tea, or orange juice (all of which are imported) pays more in Canadian dollars to consume these products. There is a contrary view suggesting that domestic prices and wages should bear the burden of adjustment. This alternative view is seen most clearly in countries with fixed exchange rates.

7 In the 28th Annual Review, published in late October 1991, we stated that the underlying value of the Canadian dollar vis-à-vis the U.S. currency, based solely on the purchasing power of the two currencies in their respective countries, is about 80 cents U.S. In this report, however, we examine the broader question of the equilibrium (sustainable) value of the Canadian dollar, based on trends in productivity, real commodity prices, net capital inflows, foreign indebtedness, and the current-account position in both countries. It is on the basis of these factors that we estimate the equilibrium value of the Canadian dollar to be between 75 and 80 cents U.S.

8 In 1989, a much larger depreciation of the Canadian dollar vis-à-vis the U.S. currency would have been required to fully restore the cost position of Canadian manufacturers.

9 In some cases – for example, automated materials handling – the incidence of AMT use does not appear to increase appreciably once the 100-employee threshold is reached. In other cases – such as numerically controlled machines and automated sensor-based testing – increases in establishment scale beyond 500 employees are associated with a significantly higher incidence of use. Our analysis, on the other hand, reveals no significant increase in AMT use for multi-plant companies (whether foreign- or domestic-controlled) relative to those that have a single establishment only. This result is surprising, since one might have expected that establishments in multi-plant firms would enjoy easier access to AMT knowledge and experience. Our analysis also indicates that establishment age and recent establishment growth do not play a significant role in the use of AMT adoption.

10 See C. A. Beatty, "Promoting productivity with CAD," Working paper series no. NC86-05, School of Business Administration, University of Western Ontario, London, Ont., 1986.

11 See, in particular, David Wolfe, "The management of innovation," in Liora Salter and David Wolfe, eds., *Managing Technology* (Toronto: Garamond Press, 1990), pp. 64-65;

Roger More, "Generating profit from new technology: a current synthesis of research output and management implications," Working paper series no. NC89-02, School of Business Administration, University of Western Ontario, London, Ont., 1989.

12 The Canadian National Energy program blunted the effects of the energy price shocks but did not eliminate them. Canadian industries were still faced with a large price increase.

13 The relative levels of productivity are also of concern here. As long as the level in the industries where Canada has traditionally had an advantage remains much higher than in other industries, continued specialization in areas of poor productivity growth poses less of a problem.

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Glossary

Equilibrium value of the Canadian dollar. Sustainable value of the Canadian dollar, which reflects the fundamental strength of the Canadian economy. It is based on trends in productivity, real commodity prices, net capital inflows, foreign indebtedness and the current-account position of Canada in relation to its trading partners.

Export orientation. The share of exports in total output.

Factor input substitution. Substitution of one factor input (e.g., labour) for another factor input (e.g., capital) in the production process in response to changes in relative factor input prices and output.

Import penetration. The share of imports in total domestic demand (output + imports – exports).

Labour productivity. Real output per unit of labour input (employee or person-hour).

Purchasing power parity (PPP) exchange rate. Exchange rate between any two countries that reflects the purchasing power of the currencies in their respective countries.

Real consumer wage. Nominal wage relative to the consumer price index.

Real exchange rate. Market exchange rate between any two countries, adjusted for differences in their inflation rates.

Real per-capita income. Gross domestic product (in constant dollars) per person.

Real producer wage. Nominal wage relative to the output price received by the producer.

R&D propensity. Two indicators of R&D propensity are used in this Statement. The first measures the ratio of R&D expenditures to gross domestic product (value-added), while the second is measured as the ratio of R&D expenditures to sales (gross output).

Revealed comparative advantage. This commodity export specialization indicator measures comparative advantage as the ratio of Canada's export share in a commodity at the world level to Canada's aggregate share of exports in total world exports. If the ratio is greater than 1, Canada has a comparative advantage; if the ratio is lower than 1, Canada does not have a comparative advantage.

Total factor productivity (TFP). The overall efficiency of the production process, measured as the real output per unit of total factor input (a weighted sum of all factor inputs).

Trend productivity growth. Improvements in the underlying efficiency of the production process.

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Project Team

Council Staff

Sunder Magun, project director
Ronald Corvari
Roger Heath
Marie Lavoie*
Tony Lemprière
Raynald Létourneau
Bimal Lodh*
Orlando Manti
Andrée Mayrand*
Someshwar Rao
Lesle Wesa*

Danielle Wright, secretary

*Left the project before its completion.

Consultants

Richard Harris, Simon Fraser University
James R. Markusen, University of Colorado
Donald McFetridge, Carleton University
Pierre Mohnen, Université du Québec à Montréal

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